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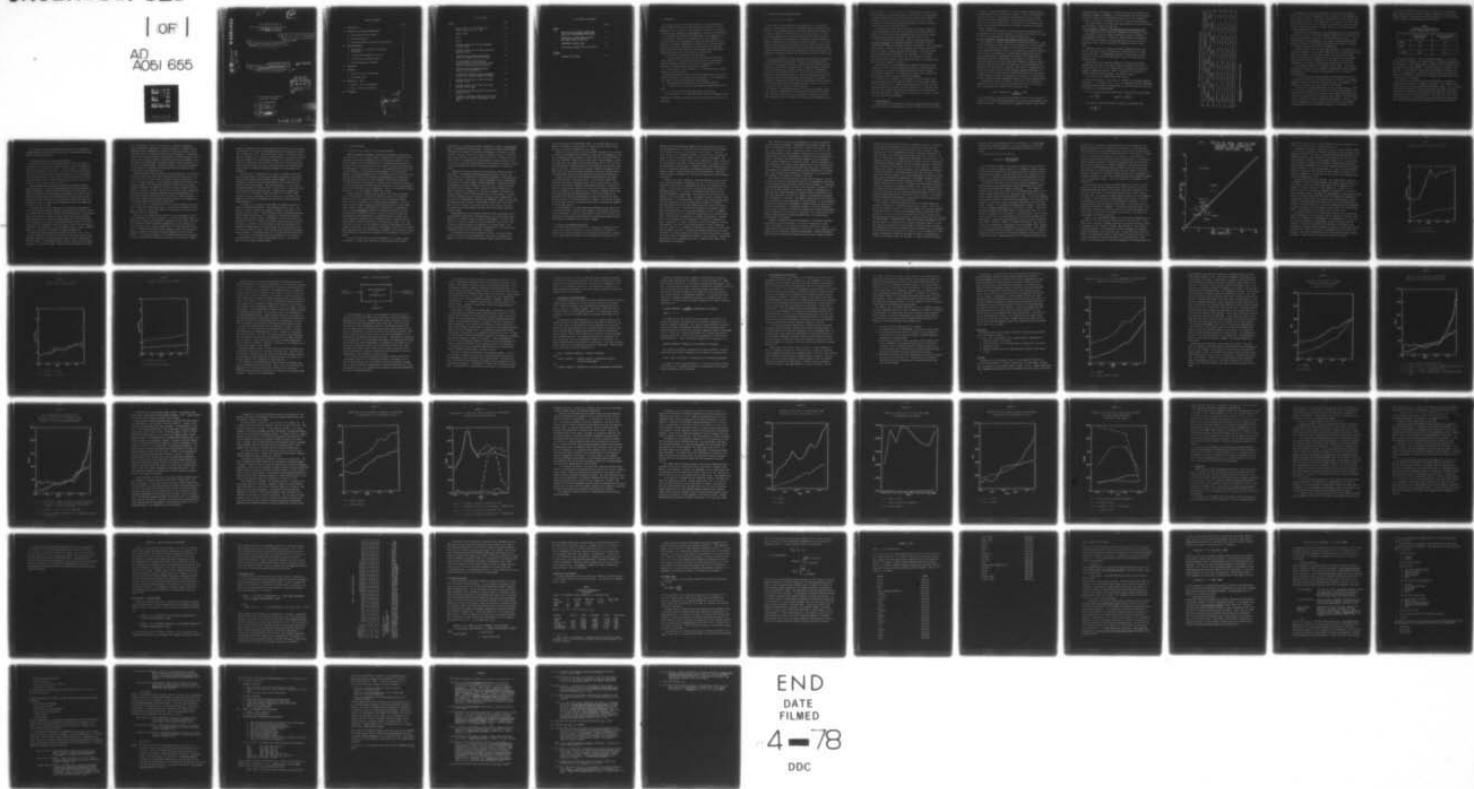
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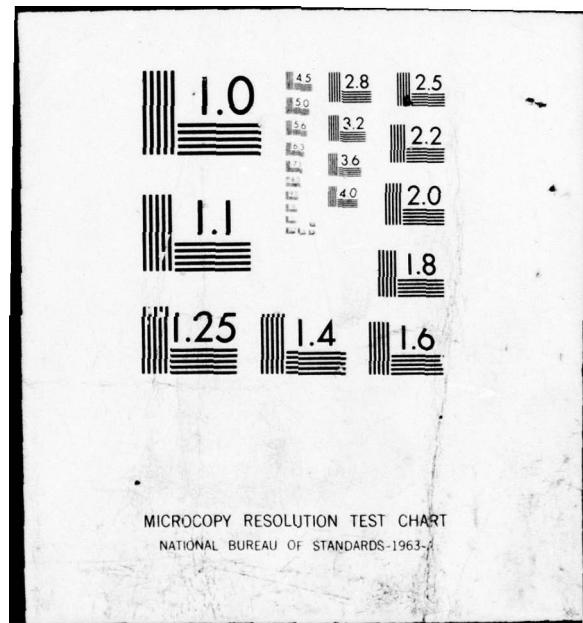
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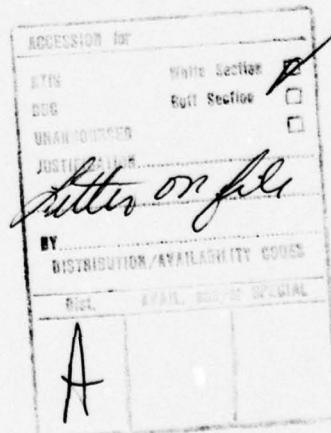
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## I. INTRODUCTION

The present document is the Final Report on work undertaken under contract #N00014-76-C-0639 covering the period of February 1, 1976 to November 30 of the same year. The purpose of the grant was to permit Professors A.F.K. Organski and Jacek Kugler to explore four key problems:

- 1) The empirical definition and measurement of the capacity of political systems. Changes in the capacity of political systems are a critical portion of the phenomenon of "political development" and are, moreover, an important ingredient in differentials in national growth, which, in turn, affect profoundly the distribution of international power (Binder 1972; Holt and Turner 1976; Organski 1958, 1968, 1961; Organski and Kugler 1975, 1976; North and Choucri 1976);
- 2) The empirical estimation of national power;
- 3) The forecasting of the outcomes of international military non-nuclear conflicts. The prediction of the outcomes of international military conflicts have been used as tests of the validity of the measures of different aspects of political development;
- 4) The estimation of the "capacity" of a political system to absorb resources from other nations.

The present document includes a detailed accounting of all work done during the segment of time covered by the contract. The information in this report is distributed under four major headings.

- A. Discussion of the substance of the problem investigated.
- B. A discussion of the research initiated and completed under this grant.
- C. A set of conclusions reviewing research and findings.
- D. Two appendices, one covers additional technical procedures in the development of indices as well as sources and types of data used in all work done.

## II. OUTLINE OF THE PROBLEM INVESTIGATED

### A. The Substance of the Problem

↓ Past errors in predicting victors and vanquished in international wars are rooted in major defects of available measures of national capabilities. The principal source of difficulties has been the absence of a direct estimation of the efficacy of the political system, for there has been no rigorous way to evaluate the real effectiveness of governments. Techniques for appraising the performance of national economies cannot be applied to the performance of political systems. If one could measure political capacity and combine such an estimate with other data relating social and economic performance, long in use to measure national capabilities, one would be able to estimate with sufficient accuracy the strengths of nations and predict the outcome of any total but non-nuclear war. → next pg

In the first section we briefly explain our suspicions of the adequacy of existing measures and why usual procedures for estimating national capabilities have proved deficient. The next section presents an index of political development and demonstrates how this measure has been combined with existing socio-economic indices to obtain a comprehensive estimate of the strengths of nations. The final section tests our new measure of national capabilities. We intend to determine whether or not the model we have constructed permits the estimation of the relative strengths of combatants in recent wars with sufficient accuracy to enable us to predict the results that actually occurred. That is, in social-sciences, we shall "post-dict" some conflicts.

Our method of validating the measure of political development should be of interest to specialists of international relations and to laymen alike, for when a war looms or is in progress, its probable outcome is vital information to all concerned. Of course, prudence suggests that we

avoid prediction. It is one thing to provide plausible explanations of past conflicts, quite another to project theories into the future, where a single unexpected turn of events can make a mockery of the neatest of hypotheses. Yet the possibility of prediction is invaluable to any scientist; for repeated and accurate forecasting of events is the most useful validation of scientific theory.

We have chosen our test cases to ensure that the major combatants tried wholeheartedly to win the wars to which they committed their resources. We have also selected examples in which, had earlier methods of measurement been used, the results would have been in error.

We have posited four recent wars. Three of them had conclusions different from those one would have expected at the onset. The four conflicts are: 1) The wars between the Arabs and Israelis. 2) The war between North and South Vietnam, with the assistance of the Soviet Union, the People's Republic of China, and the United States. 3) The very brief struggle between India and China in the Himalayas. 4) The Korean war, in which North and South Korea were the combatants of record, but where the major portion of the fighting was done by the United States and the People's Republic of China.

If the results of our measurements are congruent with what actually occurred, we shall have made an important first step toward predicting the outcomes of conflicts and toward validating our overall measure of national capabilities. If that measure is valid, then we shall also have evolved a valid measure of political development.

Our view is not unorthodox. The strength of a nation rests in its basic institutions, in the number and skills of the populations making up the national society. Military organizations are, at best, an intervening variable whose ultimate influence, however, will correlate closely with the socio-economic and political performances we measure directly. Stalin's apothegm that "power comes out of the barrel of a gun" is partially true but totally misleading.

#### B. Existing Measures

In many respects, the measures of national capabilities based on hard data from national accounts distort reality in the same way as do intuitive

procedures. A particular weakness is that such measures perform unevenly in comparisons across time and across countries. While socio-economic indicators in one set of circumstances can generate some fairly reliable estimates of national capabilities, the same measures, applied to other systems, lead to substantial errors. Time series of socio-economic data provide very uncertain footing for the researcher interested in indexing national capabilities.

While a half-dozen methods of evaluating national capabilities have been proposed,<sup>1</sup> only two are developed to the point where they may be readily used in cross-national and cross-temporal comparisons:

The A.F.K. Organski - Kingsley Davis Measure of National Power<sup>2</sup>

One yardstick of national capabilities is gross national product. The utility of measures of total output for the estimation of national capabilities is not surprising. Estimates of GNP closely reflect the movement of the underlying variables crucial to the generation of national resources -- the fraction of the population of working and/or fighting ages and the level of productivity. Measurements of productivity are particularly informative about the contributions of individuals to the GNP, for they accurately parallel the levels of available technology, education, capital intensity, and many other attributes essential to the establishment and maintenance of national power. Moreover, high levels of productivity also denote the capacity of the political system to aggregate individual contributions to form national pools of war-making potentiality. Less directly, GNP figures also mirror the capacity of a society to pay for external security, because military expenditures depend on levels of national wealth.

Because total output of a nation is the result of the interaction between the size of the productive population and its level of productivity, the national power equation can be expressed thus:

$$\text{Power} = \text{Population} \times \frac{\text{GNP}}{\text{Population}} = \text{GNP}$$

In this formulation, total population reflects the size of the fraction of population of working and fighting ages,<sup>3</sup> and per-capita product implies their productivity level. The interaction of components assumes a proportional

weighting system. Fluctuations in productivity affect the importance of populations upwards or downwards. A given population twice as productive as another implies that two individual workers in the less productive economy are required to perform the labor of one in the more productive.

The second measure of national power taps resources that could be used in our evaluations of power distributions.

The J.D. Singer, S. Bremer, J. Stuckey Measure of Nation Capabilities

<sup>4</sup>

The authors argue that three major dimensions are sufficient to give an indication of overall national capabilities: military, industrial, and demographic capacities. Others are considered much less important, or are so closely related to the principal three that they are well represented in the variables cited and the indicators chosen to denote them.

Industrial capacity is denoted by energy consumption and iron production. Military capacity is measured by expenditures and the number of men under arms. The demographic component is represented by total population and the number of inhabitants of cities of twenty thousand persons or more.

Having selected the countries judged to be critical, the authors gathered data for each. With these in hand, they added up the values of each indicator for all the countries in the system; each country was awarded its appropriate share. Table 1 illustrates the procedure followed by Singer and his colleagues. (see Table 1, page 5).

The process can be formally written as follows:

Let  $X'_{ij}$  be the measure, in real units, of country  $j$  on the power component  $i$  where  $j=1, \dots, n$  nations and  $i=1, \dots, r$  components of power dimensions. The final relative measure of capabilities  $X_{ij}$  for any country in the system is derived in a two-step procedure:

(1)  $X'_{ij}$  are converted from level units to share units  $X_{ij}$  as follows:

$$X_{ij} = \frac{X'_{ij}}{X'_{i.}} \quad \text{where } X'_{i.} = \sum_j X'_{ij}$$

(2) Then the capability measure for country  $j$  is derived from:

$$\frac{100}{r} \sum_{i=1}^r X_{ij}$$

TABLE 1. COMPUTATION OF NATIONAL CAPABILITIES USING THE SINGER-BREMER-STUCKEY MODEL

Nation	Military Dimension			Industrial Dimension			Demographic Dimension			Relative Capabilities		
	Military Expenditures	Military Personnel	Iron-Steel Production	Energy Consumption	Total Population	Urbanized	Total Units	Real Units	%	Real Units	%	Total All Dimensions (INDEX / 6) Adjusted %
A	1,000,000	33.4	10,000	5.0	100,000	33.4	100,000	50.0	20,000	10.0	15,000	30.0
B	1,000,000	33.3	30,000	15.0	100,000	33.3	50,000	25.0	20,000	10.0	10,000	20.0
C	1,000,000	33.3	160,000	80.0	100,000	33.3	50,000	25.0	160,000	80.0	25,000	50.0
<b>Totals</b>	<b>3,000,000</b>	<b>100.0</b>	<b>200,000</b>	<b>100.0</b>	<b>300,000</b>	<b>100.0</b>	<b>200,000</b>	<b>100.0</b>	<b>200,000</b>	<b>100.0</b>	<b>50,000</b>	<b>100.0</b>

<sup>a</sup>Table prepared to illustrate how capabilities are derived.  
All data imaginary.

The measure has a number of advantages. It permits the standardization of the different components of the index prior to their aggregation into a single indicator. The national capabilities of a nation can be compared without regard for the fluctuations of real capacities in the system, and the number of nations in the sample can be increased at will and cross-national comparisons can still be drawn, because each evaluation produces a meaningful relative scale.

Nevertheless, the procedure has some disadvantages that are particularly severe when one tries to make cross-temporal comparisons, for these can only be made if the sample of nations in the system remains the same. If there are alterations in the membership of the system, comparisons become meaningless, because the scale reflects variations in the sample and changes in individual nations that cannot be disaggregated.

Another problem is that the Singer et. al. measure is a relative one, in which the capabilities of one nation depend not only on its performance but on that of the sample as a whole and on every other nation in the sample. One cannot determine, if one nation declines, that this occurs because that particular nation is doing worse or, conversely, if the average performance of the sample is improving faster than that of the nation.

These problems, however, are important but not fatal. The critical problem is the validity of the measures in estimating national strengths. We designed a test to evaluate the performance of the two measures of national power.

If one estimates the relative strength of two combatants and the result predicts accurately the eventual winners and losers of the struggle, assuming that both parties have exerted themselves wholeheartedly, one then can be reassured about the validity of the measure.

To subject the Organski-Davies model and that of Singer et.al. to this kind of test we needed first to render the two measures comparable. We followed for the GNP measure the same procedure Singer et.al. outlined in the last two steps they used to construct their measure. The GNP values for the countries we wished to compare were aggregated to provide a total value of capabilities for the system. Then each country was assigned the percentage share that each GNP represented of the system's total.

We used the Arab-Israeli war of 1967 as a test case for the performance of the two measures. What we wished to determine was how well the GNP and Singer et. al. measures predicted the outcome of a conflict whose result was known. The discrepancies are different:

TABLE 2  
COMPARISON OF POWER SHARES OF  
EGYPT AND ISRAEL PRIOR TO 1967 WAR

	Organski-Davis Power Index	Singer-Bremer-Stuckey Power Index
ISRAEL	39%	27%
EGYPT	61%	73%
TOTAL %	100%	100%

Two points are evident. The less important findings for our purpose here is that the Singer et. al. measure distorts reality far more than does the GNP measure. This indicates that the addition of more indicators does not improve the overall estimate. The second finding is critical. Irrespective of the differences between them, both measures widely miss the mark. It is impossible to consider trustworthy indices that distort the strength of combatants and give rise to completely erroneous expectations of the outcome of a conflict.

The result we have obtained are not the consequence of simply comparing the two countries at a single point in time. More extensive comparisons would not produce significantly different results. If, for example, we use GNP as a measure of national capabilities and compare the United Arab Republic with Israel for the entire period 1955-1975, the results are similar to those indicated in Table 1. (See Graph 6, p. 34). In the case of both methods, the Arab side is made to appear much stronger than the Israeli, and we know this appreciation to be at odds with reality.

Any measures of national capabilities that are to be considered acceptable should perform far better than these in forecasting winners and losers in military conflicts.

C. The Missing Measure of Political Development

The measures of national capabilities we have tested fail mainly in cases when a developing and a developed nation, or when two developing nations go to war against each other. In such instances, a measure of political development is essential. Yet none so far has been available. This may seem incredible, for the essential meaning of "the development of a political system" has been a major concern of political scientists since the middle 1950s' but their efforts have provided no help to our work here. Three points should be recalled.

The work done under the rubric of political development has been largely theoretical. There are some exceptions to a purely theoretical and/or describable orientation which we shall discuss briefly below. By and large, however, the body of material developed in the 1960's, when interest in the exploration of the problem was at a high pitch, does not provide much direct assistance to the question we pose.<sup>5</sup> Most important, literature in this area does not offer measures of political change that we need to be able to index.

There were some notable exceptions to the theoretical orientations of the early wave of studies, and among these stands out the work of Adelman, Morris, Inkeles, Deutsch, Rokkan, Gurr, and Cartwright.<sup>6</sup> Our dissatisfaction with some of the measures these authors have proposed centers on their almost universal choice of additive procedures for the aggregation of the indicators they deploy, the excessively large number of such indicators, and their dependence on cross sectional rather than cross temporal indicators. Most important of all, such measures seem to draw on behavior already well monitored by measures of economic performance.<sup>7</sup>

Beyond the work mentioned, other materials should be cited. There is a very large body of research in the field of political behavior (particularly comparative political behavior) that has been concerned mainly with the quality of representativeness and the levels of political participation in political systems. This work is both rigorous and system-

- 10 -

atic, and addresses itself to the problem of political development. With the behavioral revolution, it became possible for research to treat empirically some fundamental propositions of democratic theory, and the democratic bias in the research carried out was accentuated. Substantive concerns are with participation, representation, electoral behavior, identification with political parties and political institutions generally, the development and transmission of political ideas, political preferences, attitudes, and belief systems. These are, however, in large part questions of the "quality" of political life and probe only very indirectly into the question of how things get done.

Yet how things get done is precisely the answer we seek. The question we need to pose is not "are elites representative of mass publics?" Rather we want to know if elites have the tools to generate resources to be used for national purposes. We ask questions diametrically different from those that Western and, especially, American scholars have been posing. Slightly elaborated, the question to which we require an answer should be phrased as follows: do elites have the tools to extract human and material resources from their societies, aggregate the many contributions each citizen makes into national pools, and use them for national purposes? In this form it seems to us the question relates directly to the capacity of a political system to perform the required task.

In short, then, the reasons why we do not have the answers we need are that, over the last decade and a half, the proper questions have not been posed. Ironically enough, this omission is principally the result of the democratic bias of researchers.

There are other reasons why the need for direct measurement of political development have finally emerged. In the past it has been taken for granted that economic and political development go hand in hand. The failure to measure political mobilization separately was not perceived as a serious lacuna, for it could be assumed that if a nation possessed a high level of economic productivity it also possessed a high level of political capacity to mobilize the human and material resources in the national society.<sup>8</sup> This seemed reasonable. In the Western experience, the expansion of political networks that penetrated mass publics, and political systems

capable of sustaining their society through major efforts, grew in response to a desire of the masses for governmental protection against the vicissitudes of industrial life. Because in Western Europe, in Western European enclaves overseas, and in Japan, the effectiveness of the political capacity kept pace roughly with socio-economic changes, it was possible to infer political development from the sources of key socio-economic variables. If the latter were relatively high, one could assert with confidence that scores would be as high for political variables, if such measures were available.

The error lies in assuming that low levels of economic productivity and low effectiveness of the political system are similarly associated. The last three decades have witnessed repeated examples of nations that experienced a degree of political mobilization far in advance of substantial economic development. This is particularly so in the case of non-European communist countries, but it is also true, in less vivid form, of other developing countries as well. Because of this abrogation of the pattern of development along the lines of the Western model, economic and social performance ceased abruptly to be uniformly a good predictor of political performance, and the need for separate measures became imperative.

The change in the sequence of development had immediate massive effects on international behavior. The incredible began to occur. The weak, not content to inherit the kingdom of heaven, seemed bent on conquering the earth as well. The Viet Cong and North Vietnamese mauled and finally fought the Americans to a standstill, as the Chinese had done fifteen years earlier in Korea. The Israelis, in their new desert site, defeated the forces of countries collectively larger than they by factors of fifty to one hundred. The root causes of what was happening did not immediately become apparent to policy makers, and the implications were not clear to scholars, either. But even after the problem was identified, no one produced a satisfactory model, and the matter remained unresolved.

Such are the circumstances that have contributed to the absence of the required measure of political development and the reasons why the need for such a measure became visible.

### III. THE NEW RESEARCH

#### A. Construction of a Measure of Political Development

Before considering a measure of political development, we must state succinctly what it is we seek to index. We begin with a definition, for the expression, "political development," has been thoroughly muddled. Some writers define it as the transformation of a population from subjects into citizens; still others describe it as the spread of political participation, the building-up of a state structure (i.e., the administration and the army), the mobilization of a populations, the development of a mass political parties, the increasing capacity of the political system to direct the socio-economic sub-systems, the development and dissemination of nationalistic feelings and the discipline of such feelings, as the spread of equality, the differentiation of institutional structure and the increasing capacity of the political system to handle the load imposed on it by its environment.<sup>9</sup> The list of perceptions could be lengthened. Each of the definitions appears defensible. We do not intend to dispute any of them.

We must, however, elaborate what we mean by "political development." This is the capacity of the political system to carry out the tasks imposed upon it by its own political elite, by other important national actors, or by the pressures of the international environment. It is evident to us that a highly capable political system need not be free, democratic, stable, orderly, representative, participatory, or endowed with any of the other desiderata alluded to by laymen and experts as bases for evaluating the political life of a nation. One may well argue that non-democratic, non-participatory, or non-representative systems could not be regarded as developed in any "normative" sense. But we do not consider normative criteria relevant for the information we seek. It is also clear that at the level of the individual, political development is mostly a matter of attitude. For individuals, "development" in the field of politics means awareness, political participation, a feeling of efficacy, and a realistic appreciation of whether or not problems can be disposed of by political means.

But at the system level, political development is no longer a matter of attitude. To assert that one polity is more developed than another

means that it can generate more human and material resources, ceteris paribus, to accomplish necessary ends. Political development means capacity, and capacity is dependent on political performance in two areas: a) penetration of national resources by central governmental elites to control as many subject/citizens as possible within the political jurisdiction of the state; and b) the capability of the government to extract resources from its society. Penetration and extraction are the behaviors we need to index in order to measure the extent of internal development of the national polity.

Governmental powers to penetrate and extract are obviously related to each other. If government has successfully penetrated a society, one should expect it to perform well in extracting resources. The reasons are not hard to find. Historically, central governmental elites, buttressing the dynastic or colonial regime, sought incessantly to penetrate the mass of population to extract resources. Louis XII, XIII, and XIV of France, the Tudors of Great Britain, Peter the Great of Russia, Frederick the Great of Prussia are examples of a long list of monarchs who sought ever greater control of their nobles and the mass of their subjects, in order to obtain increasing pools of resources to support their armies which, in turn, were the indispensable support of the dynasties' "right" to rule. Only by compelling their "estates" to work harder, produce more, and collect more could the dynasties' own power, and even their persons, be secure. The motive power and mechanisms that gave rise to the nation state were brutally simple.

Though penetration and extraction should be highly correlated in most cross-national comparisons of developed nations, they should behave autonomously in the initial stages of political development. In such cases, however, one cannot be certain by direct observation of one factor that the other is always present or is operative to the same degree. The largest discrepancy between extraction and penetration is in that portion of politics that can best be described as symbolic.

An illustration will help to clarify the point. In some instances, voting is a form of symbolic penetration. East African villagers, for example, may vote in national elections but remain virtually untouched

in any other respect by governmental power. On the other hand, one can think of situations in which capacity to extract exceeds levels of penetration of a central government into its society.

Penetration and extraction are both essential components in the process of political development but extraction is often the more complicated, costly, and dangerous process because, at least initially, populations may resist the government's intrusion into their lives. And governments, especially weak ones, have sought to have their cake and eat it too, by obtaining resources and avoiding face-to-face confrontations with the people who must pay the bill. Indirect taxes, tariffs on imports and exports, value-added taxes, and taxes on foreign enterprises are ways of raising revenue while minimizing the need to deal directly with the national population.

Finally, we should note that penetration and extraction may spread very unevenly across a national society. A sector may be highly penetrated and the central government may be able to extract from it a large portion of the wealth it produces, while another fraction is scarcely affected by central power, permitted to live by its own rules, contributing little or nothing to the central pool of resources. Examples can be found in non-developed and developing societies. The tribal peoples of the Philippines, the Maoris of New Zealand, the Kurds of Iraq are but three extreme instances of hundreds from which to choose. Even the most developed nations have pockets of population which still contribute only nominally to the national society.

Let us summarize. We define political development as the capacity of the political system to fulfill tasks imposed by its domestic and international environment. Capacity of the political system rests in turn on its performance in penetrating the society and in extracting resources from it. It is these twin behaviors that we need to measure.

#### B. An Index of Governmental Extraction

In view of what we have noted so far, it should not surprise that we turned to the field of taxation in order to transform our theoretical concerns into operational measures of penetration and extraction. Nothing is more logical and more elegant than to estimate the effective depth of

penetration by determining the number of people taxed directly by the central government and to equate the level of extraction with the amount of governmental revenue as a proportion of total product. Taxes are exact indicators of governmental presence. Few operations of governments depend so heavily on popular support -- or on fear of punishment. Few affect so directly the lives of most active individuals in each society, and few are avoided so vigorously. Without some form of tax revenue, there is no national unity and no control. Failure to impose and extract taxes is one of the essential indicators of governmental incapacity to obtain and maintain support. Gabriel Ardant has put the matter well: "The fiscal system [is] the 'Transformer' of the economic infrastructure into political structure."<sup>10</sup>

We must first record a failure. Of the two behaviors we need to measure, we have succeeded in estimating only one. We found that the data required to index political penetration was either not available or inaccurate. At first glance, the use of electoral data appears to offer a promising solution. It's relative accessibility would permit at least limited international comparisons. But electoral data can be very misleading. We are not worried about the degree to which a system is truly representative. Our problem reposes in the fact that voting, per se, does not tell us whether the level of penetration is symbolic or genuine. In the Soviet Union and in most East European countries, almost the entire adult population votes. This electoral procedure does not mean, however, that those elected represent the voting population; rather it suggests that the national society is effectively penetrated by the central government. Some elections are important as systems of penetration. Although the form of government is not democratic, "the degree of government is high." Conversely, in India, in Indonesia, and in non-communist Southeast Asia generally, the size of the voting population is large, though not nearly so large as in the communist countries; but penetration in most cases is more symbolic than real. Transporting villagers quadrennially or quinquennially to polling places so they may put their marks on pieces of paper is often the limit of governmental influence on their behavior. Control and penetration are more imagined than actual. Electoral data used for this purpose would be deceptive.

What could serve us best is an enumeration of citizens taxed directly by the central government. Information on the number of income tax-payers is available for some of the Western countries and others. However, major problems develop. Comparisons cannot be made with centrally controlled economies because communist countries have rejected personal income taxes as a source of revenue and, instead, tax their populations indirectly. Moreover, even with the free economies of the non-communist world, possible comparison is relatively narrow. Data are lacking or totally unreliable in the case of many (perhaps most) of the developing countries. In the more advanced nations where such data exist, the problems of gathering the information and making the data comparable are overwhelming. These difficulties can possibly be surmounted, but at present such work remains in the category of research to be done.

Our attempt to measure extraction was much more successful. The construction of a measure permitting an evaluation of governmental performance in extracting resources was greatly aided by the development of a procedure for determining governmental success in the collection of revenue.<sup>11</sup> The index of tax effort permits us to express the degree of governmental tax collection and, though developed for purposes entirely different from our own, seems tailored to our need for a measure of governmental performance in the extraction of resources. The index is obviously more than a device for the estimation of the performance of the tax system. It is an important measure of the capacity of governments to extract resources, and its variation cross-nationally is a significant measure of political differences. In this role, the index can be used as an indicator of political development. For our purposes, it can be used as a multiplier of the other factors that form an overall measure of national capabilities, thus completing the specification of that model.

Attempts to estimate tax efforts represented a considerable departure from earlier research directions. In the past, comparisons of inter-country performance in the collection of revenue consisted of taking simple ratios of collected revenues to total product. Such ratios had little utility for the evaluation of political performance. Without adjustments, they could not be expected to perform better than other economic indicators,

serving as proxy measures for political development, had done in the past. If one compares governmental success in raising tax revenue, one must control for factors that effect the tax bases to the advantage of some countries and to the disadvantages of others. Otherwise, the results obscure precisely the performance which is what one wishes to isolate. Indeed, in extreme cases, one might obtain ludicrously distorted results. The instance of the major oil-producing nations provides the best illustration. Saudi Arabia, Venezuela, Kuwait, or Iran have high government revenues because of royalties received from the sale of their crude oil. It would be a major error, however, to give high marks to the governmental performance of these countries for extracting resources from their societies. If one controls for mineral exports, all of those governments may show up as doing quite poorly in taxing their populations. The opposite situation obtains for North Vietnam and the People's Republic of China. In these systems, economic conditions are not good: the nations are economically underdeveloped and the tax bases are consequently meager. Thus, the absolute amounts of revenue that the two governments can collect are low by comparison with some richer countries, but the political systems are doing all they can and should be given high marks for the success of their efforts. If we wish to evaluate governmental performance, we must control for the unequal distribution of economic resources across countries.

The attempt to evaluate governmental effort in collecting revenue requires an estimation of the taxable capacity of the country. One can formulate the problem in this way: tax ratios depend on the economic resources of the system and on the effort the government makes in extracting these resources. If one is to solve the equation for tax effort, one must know the economic tax capacity of the country. Indeed, the model that R.J. Chelliah, R. Bahl and their colleagues have constructed assumes knowledge of two important elements: an estimation of the amount a government ought to be taxing, given its tax capacity, and the amount of revenue actually collected. The comparison between the two enables one to say whether or not a government is as effective in this respect as it should be. It is evident that if the actual and estimated revenues are the same, the nation is operating with "normal" effectiveness, given its tax base. If actual revenues exceed the

estimated level the government should be collecting, it is doing better than could be reasonably predicted. If actual revenues fall below the estimated level, the government is performing less effectively than it should.

The index can be written as follows:

$$\text{Tax Effort} = \frac{\text{Real Tax Ratio}}{\text{Tax Capacity}}$$

One can obtain evidence of the level of collected taxes from national accounts. But how is taxable capacity to be estimated? Taxable capacity should reflect the differences in potentially taxable resources available to nations in the system. One must first specify what these factors are thought to be. Second, one must determine how such adjustments are used to derive the estimates of tax capacity for the countries in the system.

The choice of controls to use is fully reviewed in Appendix I. The Fiscal Economists that developed this model experimented with a number of factors and constructed a number of equations. Some comments are required on the choices of factors used in formulating the equation we selected to measure tax effort and, consequently, the capacity of a government to extract resources from the national society. In the final equation, we used three factors to produce effective adjustments. One, measuring the openness of the economy, was the fraction of GNP derived from the export sector. Exports -- for economic and administrative reasons -- were found to offer systematic advantages in the collection of revenue. Exports are more readily taxable than other wealth, not only because their value can be easily estimated but also because it is administratively easy to collect taxes on them, due to the centralization of the channels through which exports flow. A second factor, measuring the level of economic development, was found to require control. We used as an indicator the fraction of the total gross product originating in the agricultural sector, because it reflects the measure of development of the countryside. This argument will not surprise the reader versed in development problems. It would be startling if this fraction of GNP were not negatively related to the collection of revenue. Resources available in a subsistence farming economy

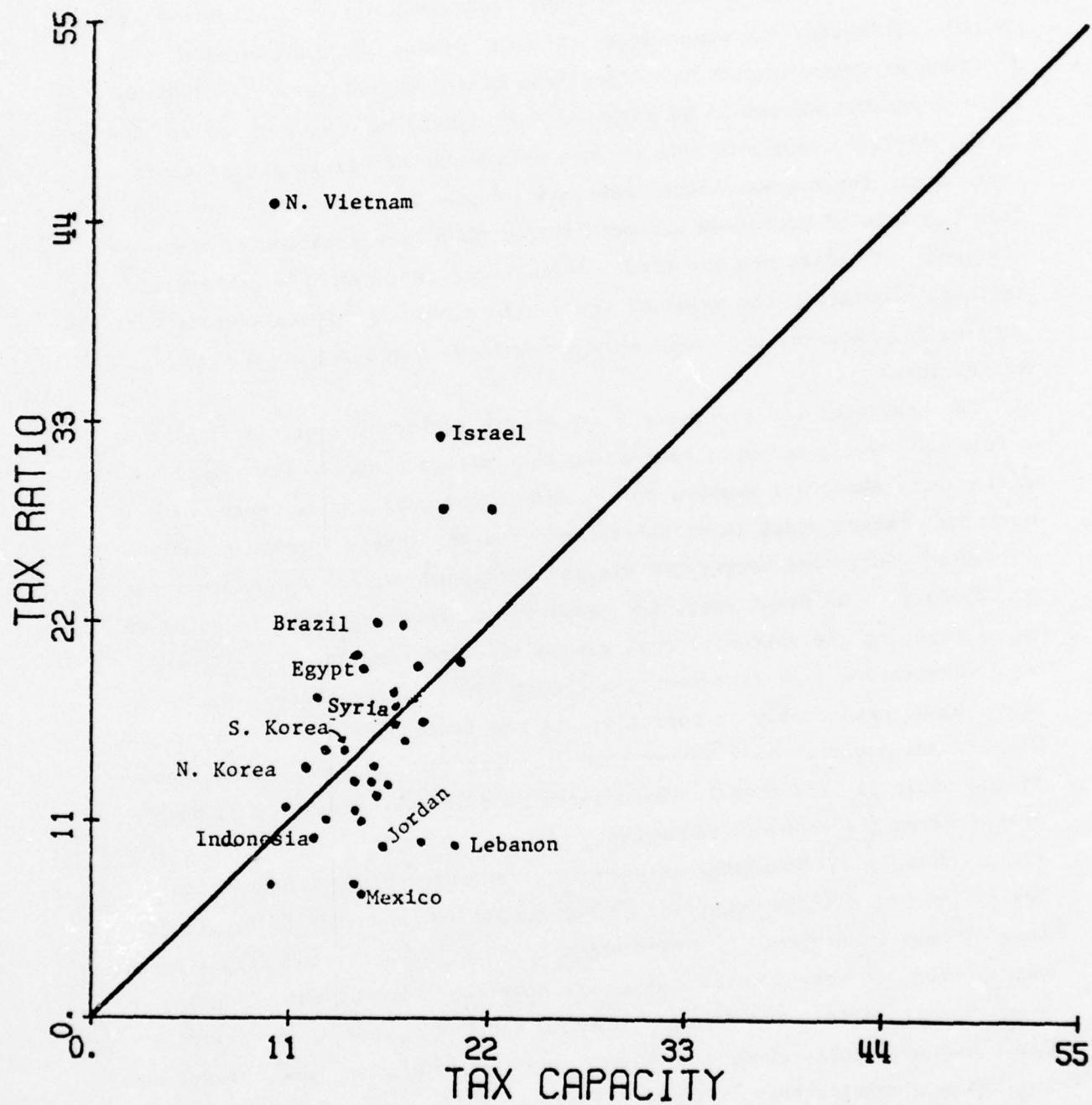
are difficult to evaluate and therefore difficult for governments to tax. Moreover, governments have trouble extracting resources from farmers who can be expected to resist surrendering even a small portion of the very little they have and who generally consume themselves all they produce. A third factor, reflecting the composition of total product, was measured by the fraction of gross product resulting from mining activities. The reasons why mineral production should be selected for adjustment have been anumerated in our earlier example of the revenue advantages of oil-producing nations that obtain their governmental revenues largely in the form of royalties from the sale of petroleum products rather than from taxation of the populations. Minerals are the kinds of resources that permit a government to estimate accurately the value of the wealth produced and are administratively easy to tax because, usually, only a few large firms are engaged in such activities.

12

The next step was to choose a systematic method of control. The procedure was to use multiple regression that allows controls for the above differences among all members of the sample and produces estimates of how much each factor added to or subtracted from tax totals in each country for every year. The regression yielded predicted values that are estimates of capacity. The final step, the measurement of tax efforts, is obtained by calculating the ratios of real tax to expected tax capacity. If the resulting ratios that represent tax effort equal 1, the tested country is performing predictably or normally. If the ratio equals more than 1, the country has a performance better than the norm for the whole sample, and if the ratio is less than 1, the country is doing worse than could be expected given its economic resources.

Graph 1, p.19 furnishes an example of an inter-country comparison of tax efforts of all the countries in our sample for the year 1970. In the case of most countries, the graph shows that tax capacity and actual levels of taxation are very similar. However, some countries deviate from the predicted standard. The Israelis and the North Vietnamese, for example, perform considerably above the normal line. On the other hand, Mexico and Bolivia are considerably below it. What should be stressed is that we interpret the deviation from the estimation of tax capability as a clear result of political factors. Political development or underdevelopment are

GRAPH 1. RATIO OF REAL TAX TO GNP  
VERSUS TAX CAPACITY  
CROSS SECTION: 1970



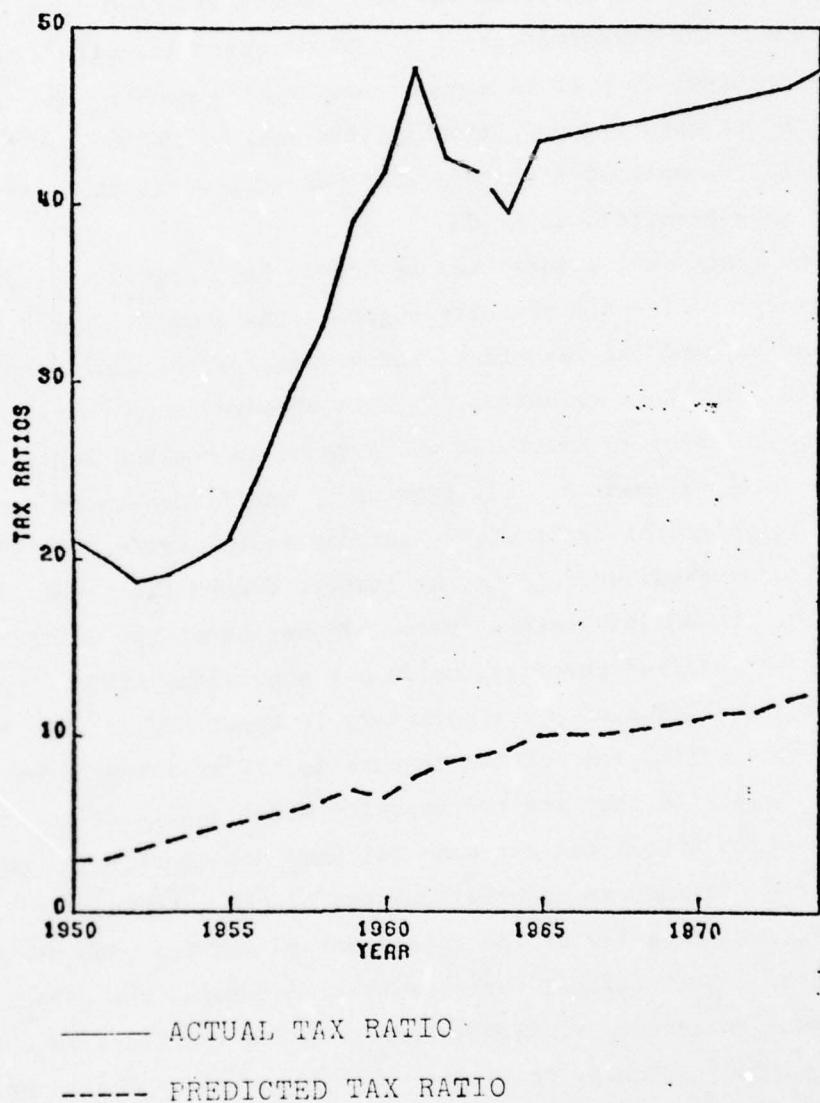
disclosed by the position of a country above or below the regression line. This is the critical point. We shall return to it.

Individual performances, taken alone, present a totally different angle of vision on the operation of the model and illustrate the operation of the index of tax effort over time. Our illustrations include one nation that performs far better than expected, one that performs much worse, and one that performs as expected. North Vietnam in Graph 2, p.21 shows how much that government has exceeded the performance expected from its economic base, given the performances of all other countries with similar tax bases. Syria, in Graph 3, p.22 is a good example of a country that has performed close to its capacity and, finally, the case of Mexico, in Graph 4, p.23 offers the example of a country that has done worse than its economic base should have permitted it to do.

Some additional points must be made. Bahl argues that in some ways the concept of taxable capacity suggests the economic resources available to a nation, and the tax effort index suggests the willingness of the system to use those resources.<sup>13</sup> This appears to us correct. But it would be an error to interpret willingness as applicable to the volition of the national leaders. Willingness or unwillingness to use resources refers really to political constraints that cannot be surmounted. Regardless of the personal predilections of the leaders toward the gathering of added revenues, the administrative system may not be of the caliber necessary to collect the desired revenues, or it may prove impossible for the leadership to form a coalition of power necessary to exact support for increased taxation. The willingness of the leaders is not at issue here.

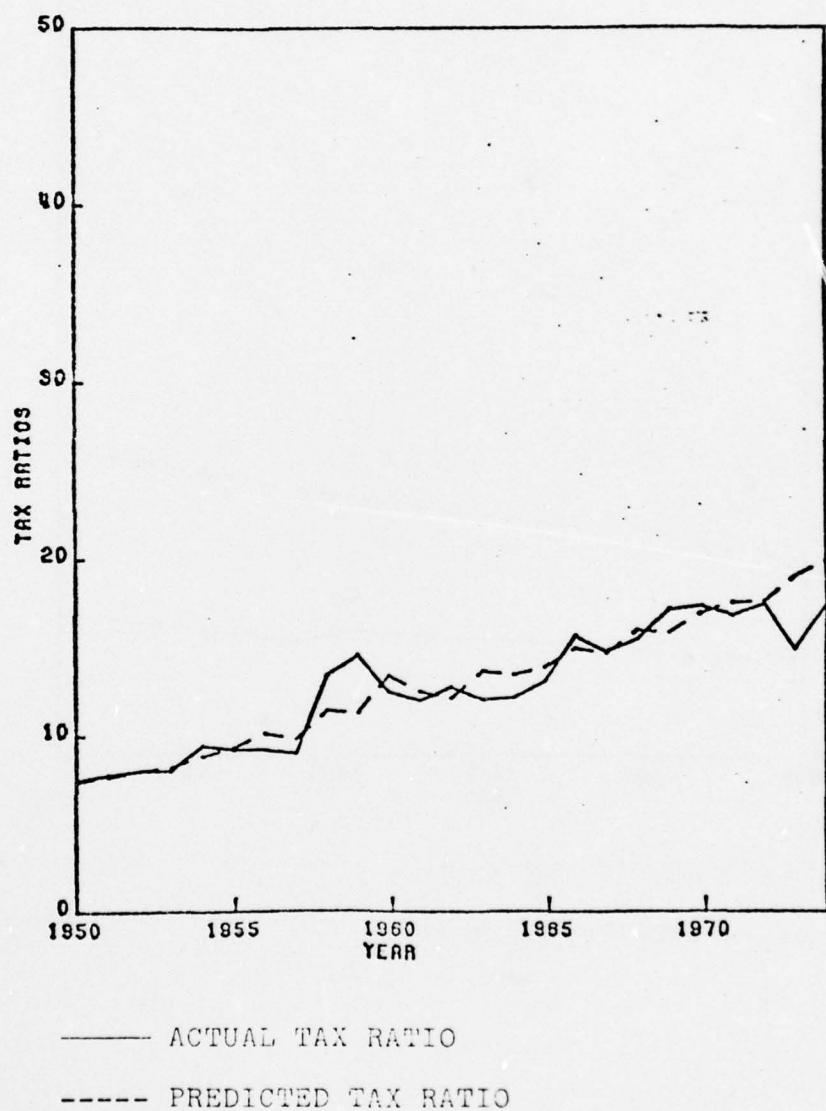
Our belief is that the tax capacity model specifies the socio-economic factors which affect the tax base but does not specify the political variables, the willingness or unwillingness of the government or, in our view, the political capacity of the government to use the economic resources available. The political variables that determine the capacity of the government to extract available resources are contained in the model but are not specified. Indeed, their impact is absorbed by the error term of the equation. What these variables are and how they operate we cannot discern at present. They are part of the work that remains to be done.

GRAPH 2  
NORTH VIETNAM: LEVEL OF TAX EFFORT



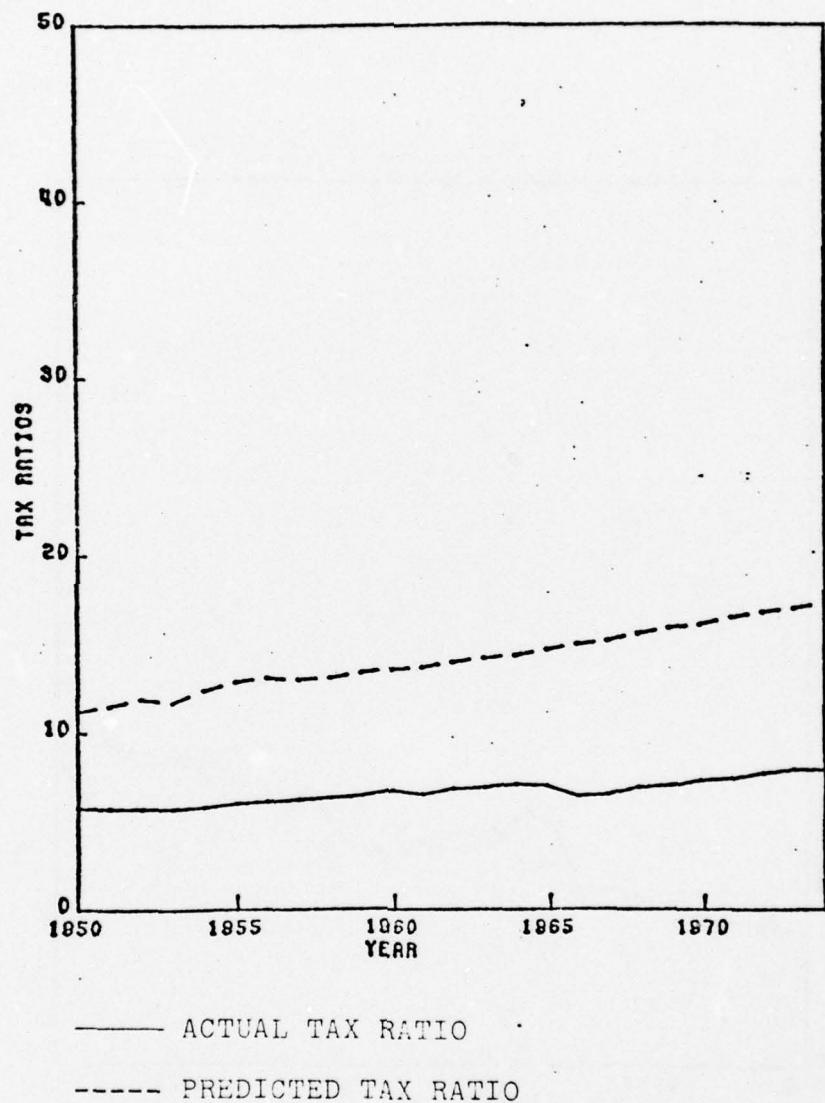
GRAPH 3

SYRIA: LEVEL OF TAX EFFORT



GRAPH 4

MEXICO: LEVEL OF TAX EFFORT



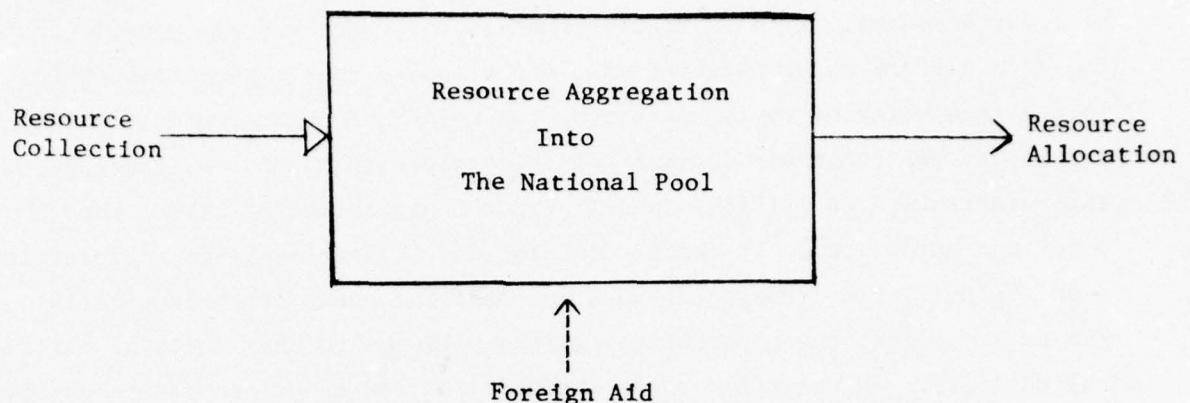
Precisely because we have no present method of measuring the factors that may influence the decision of leaders not to use the full tax capacity at their disposal, it is imperative that in the cases where a country is found to perform below expectations, the slippage should be attributable to the incapacity of the structure of the political system to do the job, and not to the conscious decision of the leaders to tax below capacity. This distinction is critical in defining the population of cases where the model can be applied. It can be used for developing countries because, in such systems, it is reasonable to argue that the needs of the societies are so great that the governmental elites will tax to the limits of political capacity. On the other hand, the model of tax effort cannot be applied to developed systems because, at that level, some of the governments do not impose maximum taxation. Either because the need is not so great as in the underdeveloped or developing countries, or because the economic and political values of the country oppose the full exploitation of the tax base, or because some services are provided by non-governmental sources.

It should be noted here that in our experiments, we apply the model to Israel. But this application of the model of tax effort to evaluate the performance of a developed nation is not a violation of the general rule just laid down. To be sure, the Israeli system is fully developed, but we have every assurance that the government has thoroughly exploited its tax capacity. Israel has been in a state of constant preparedness for war since its inception. Therefore, we believe it is legitimate to use the tax effort model in this instance.

Two major problems remain: (a) the specific activities subsumed under the rubric of extraction; (b) the matter of foreign aid. Since our goal is to present a validation of the model which uses international conflicts as test cases, we must explain how we have dealt with the problem of resources provided to the combatants by other countries.

The extraction of governmental resources includes two behaviors that must be distinguished from one another. First, the actual collection and aggregation of available resources into national pools; second, the distribution and allocation of resources for purposes the government deems necessary. Consider the following figure:

FIGURE 1. RESOURCE UTILIZATION



It seems reasonable to argue that the behaviors involved in the two-step process we have described are not identical and should be measured independently and directly. A government may be more successful in extracting resources than in pooling them or allocating them. This is a universal pattern and the knowledgeable observer of governmental behavior will take for granted loss of resources once they have reached the pool and begun to be distributed to the areas in which they have been allocated. There will be losses en route no matter what is the form of government, or how developed are the economic and political systems. Inefficiency or corruption of the bureaucracy or of the political elite may be the reasons why resources do not reach their proper destination. The question is not whether or not there will be losses of resources in the allocation process, but, rather how large such losses will be. There can be no doubt, therefore, that it would be preferable to measure the extraction and allocation of resources independently. This, however, we cannot now do.

It is evident that the two behaviors are highly correlated and that if a government scores well in extracting resources it also ought to score well in allocating them. For our purposes, this high correlation is important to the way in which we compensate for having available only one of the two measures we need. We coped with this problem by weighting experimentally our ratio of governmental effort.

The treatment of outside assistance is an important question. In the field of international politics, much of the researcher's attention is devoted to the transfer of resources across international frontiers. In estimating the relative strength of combatants in international wars, the aid received from abroad is always an issue. One question that must be answered is whether the combatants fought entirely on their own, or were helped by friends from abroad. In the case of those of the four international conflicts used in our own validation procedure -- Vietnam, Korea, and the Middle East -- aid ranged in significance from very important to absolutely crucial. Therefore, we must have a way of entering this kind of aid into our calculations.

The entrance of resources from abroad adds a new element to the model of extraction and allocation we have already detailed (see Fig. 1 p. 25). In the case of foreign aid, the resources in question appear in the first instance at the national-pool level and are really allocated from there. However, once resources are given to a country, they may be used well or merely dissipated. The capacity of the country to allocate resources is the critical variable in the question of how much of the resources received will be put to the intended use. It is difficult to effectively absorb foreign aid. The problem is not confined to the materials of war. We have not definitively resolved the difficulty insofar as our measure is concerned, but we have attempted to take it into account. We have compensated for the lack of an independent measure of allocation of foreign assistance by using the index of tax effort of the recipient country as a multiplier. It is argued here that a government which wastes its own resources would waste in comparable degree those provided by others.

The use of foreign aid presented us with special problems. In two of the conflicts we employed as test cases, massive assistance was given to the combatants but was not handed over to them outright. The patron carried on its own military operation, providing troops and supplies for its own battles in addition to furnishing its client with a good deal of direct aid. The problem lies in evaluating the allocation of the aid delivered

to target directly by the donor. Should the index represent the capacity of the donor or that of the recipient? We elected to argue for the latter. Though the military operation of the donor was largely independent of the control of the indigenous authorities, the operation was carried on in a setting entirely in the hands of the client. Thus, operations of the patron depended on that of the client.

C. A New Measure of National Power

We indicated earlier that GNP was the most parsimonious index of national capabilities now available, but that it was not sufficiently accurate to use for predictive purposes when applied without modification to developing nations. We required a measure that would combine GNP and our political index in a multiplicative equation. We should briefly review the manner in which our amended measure of national capabilities was derived.

We argued from the beginning that as far as a national power was concerned, the three principal determinants are the number of people who can work and/or fight, the productivity of the working fraction of the population, and the effectiveness of the political system in extracting, pooling, and allocating individual contributions for use in the pursuit of national goals. Three proxy variables can be employed to trace the dimensions we have mentioned: Total population reflects in a rough way the size of the work force and the manpower available to the military. Per capita income provides a good measure of productivity. The index of governmental extraction is our indicator of political development. Fully developed, our function of national capabilities is:

$$\text{POWER} = (\text{INTERNAL COMPONENT}) + (\text{EXTERNAL COMPONENT})$$

where:

$$\text{INTERNAL COMPONENT} = (\text{ECONOMIC CAPACITY} \times \text{DEMOGRAPHIC CAPACITY} \times \text{POLITICAL DEVELOPMENT})$$

and

$$\text{EXTERNAL COMPONENT} = (\text{FOREIGN AID} \times \text{POLITICAL DEVELOPMENT OF RECIPIENT})$$

Because, at present, we lack a measure of penetration, the model we actually used contained only two indices: one socio-economic (i.e., GNP), and the other political (i.e., the Index of Governmental Extraction). However, since the process we seek to measure includes both extraction and allocation, we decided that the most satisfactory interim compromise, which reflects the two-step procedure, was to weight the value we obtained for the "effort" estimate of governmental extraction. We selected the figure lower than 2 because we estimated allocation to be somewhat easier than extraction. In final form, the internal component of our index of national capabilities is:

$$\text{INTERNAL COMPONENT} = \frac{\text{GNP}}{\text{POPULATION}} \times \text{POPULATION} \times \text{TAX EFFORT}^a$$

where:  $a = 1.75$

We judged that the most accurate way of estimating the value of aid received from abroad, for purposes of cross-national comparison, was in terms of financial expenditure. The value of foreign assistance was multiplied by the index of governmental extraction of the recipient without weights because it only had to be allocated, regardless whether it was handed over, as in the case of American and Soviet aid to Israelis and Arabs or, if patron powers set up their own military operations, as in the case of Vietnam and Korea. Thus, the external component of our equations, is:

$$\text{EXTERNAL COMPONENT} = (\text{FOREIGN AID} \times \text{TAX EFFORT OF RECIPIENT})$$

The external and internal components of an overall measure of national capabilities were added to establish the full measure of national power:

$$\text{POWER} = (\text{GNP} \times \text{TAX EFFORT}^a) + (\text{FOREIGN AID} \times \text{TAX EFFORT OF RECIPIENT})$$

The model is simple, even parsimonious. If it proves accurate in testing and serves its intermediate purpose, the construction of more sophisticated instruments will be warranted.

D. Tests Hypotheses and Findings

Equally important to the creation of the measure itself is the set of experiments we have designed to validate it. Our definition of political development and the indices required to make up our measure seem plausible. But one must still deal with the question of how to be certain that the measure is valid. Let us review the procedure we have followed. We selected international military conflicts to validate our measure of national capabilities. We argued that the capacity of the political system to extract and aggregate resources is a critical element in the power of any nation. Large development of this capacity in certain nations has made the difference between victory and defeat in conflicts after World War II, when countries that appeared weaker than their opponents crushed them or fought them to a standstill. If we could measure political development, we could discern that the apparent weakness of the winners was an illusion resulting from the methods used in the past for estimating national power, and that these nations were in fact much stronger than predicted because of the advantage provided by a political system which could extract resources and aggregate them more effectively than their opponents in military conflicts.

Our view that political capacity was a critical factor in the power of nations, and that military conflicts were the best available means of validating measures of political development, was not determined idly. We perceived that recent important miscalculation in this field and many of the subsequent, unexpected outcomes of military confrontations have been, at best, failures to take into account the increase in power that can be generated simply by developing a political network that mobilizes a peasant population.<sup>14</sup>

China and the Viet Cong are cases in point. In 1949, China was in a state of collapse, exhausted by a long civil war, its armies in disarray, its new communist government just assuming control. Two years later, Chinese armies entered Korea and fought the greatest power on earth to a military draw. How was this made possible? Neither population size nor economic productivity had altered significantly. Climate, resources, and land areas were constant. What had changed was a political system. For the

first time, China had a political organization and a governmental bureaucracy that could mobilize a large fraction of the population, extract all available savings from every corner of the socio-economic structure, and commit them to the war against the United States. In the case of North Vietnam and the Viet Cong, the process was similar. The military adversary of the United States was economically backward, with low productivity and a traditional peasant social structure. In addition, the population was relatively small and its military forces were poorly armed. Yet they defied defeat. Even to trained observers the situation was incredible: the weak were beating the strong. It is our intention to test the propositions hidden in the examples we have described.

We wished to probe in several directions at once. We wanted to choose the least ambiguous conflicts in order to maximize the chances of disproving our hypotheses. We sought cases that would test most clearly whether or not our measure of political development also tapped political capacity. We chose tests whose results, based on measures previously used, were unexpected. We proceeded under the following rules:

1. We chose conflicts involving pairs of nations.
2. We measured the aid that combatants received from foreign sources.
3. We selected conflicts in which at least one of the contestants scored poorly on all the variables usually considered important ingredients of national power.
4. We looked for conflicts in which the high scores received by the actual winners in socio-economic factors were not sufficient to predict their victories and tried to determine whether or not the introduction into the measure of our new political indicators reversed the estimates obtained through other estimates.
5. We selected conflicts where the contending nations faced territorial loss when the conflict was over. We felt that a real threat of territorial loss would ensure that the contestants would fight with all their might.

Specifically, the conflicts we chose as test cases were three of the four Arab-Israeli conflicts to date, those of 1956, 1967, and 1973. We have inadequate data for the period of the first confrontation in 1948. The second conflict we chose was that of the North Vietnamese and Viet Cong, helped by Soviet and Chinese military expertise and financial aid, against the South Vietnamese, propped up by massive American intervention combined with financial and other direct aid to the government of its client. The third conflict we have chosen is the Korean war of 1950-1952. In this instance, the combatants of record received economic and other assistance from the Soviet Union, China, the United States and a number of other non-communist countries; in addition, the United States (with small contingents of troops from other member countries of the United Nations) and China also did much of the fighting. It has been alleged that some air operations on the communist side were actually carried out by the Soviet Union, but the charge has never been substantiated. Our final test was the Sino-Indian war of 1962. Of the conflicts we have used as test cases, this is the only one in which foreign aid played no part, and the only one for which GNP estimates, used alone, indicated that the victorious country was in fact stronger.

Hypotheses.

Our general proposition is simple: When both sides in a war are fighting to the limits of capacity:

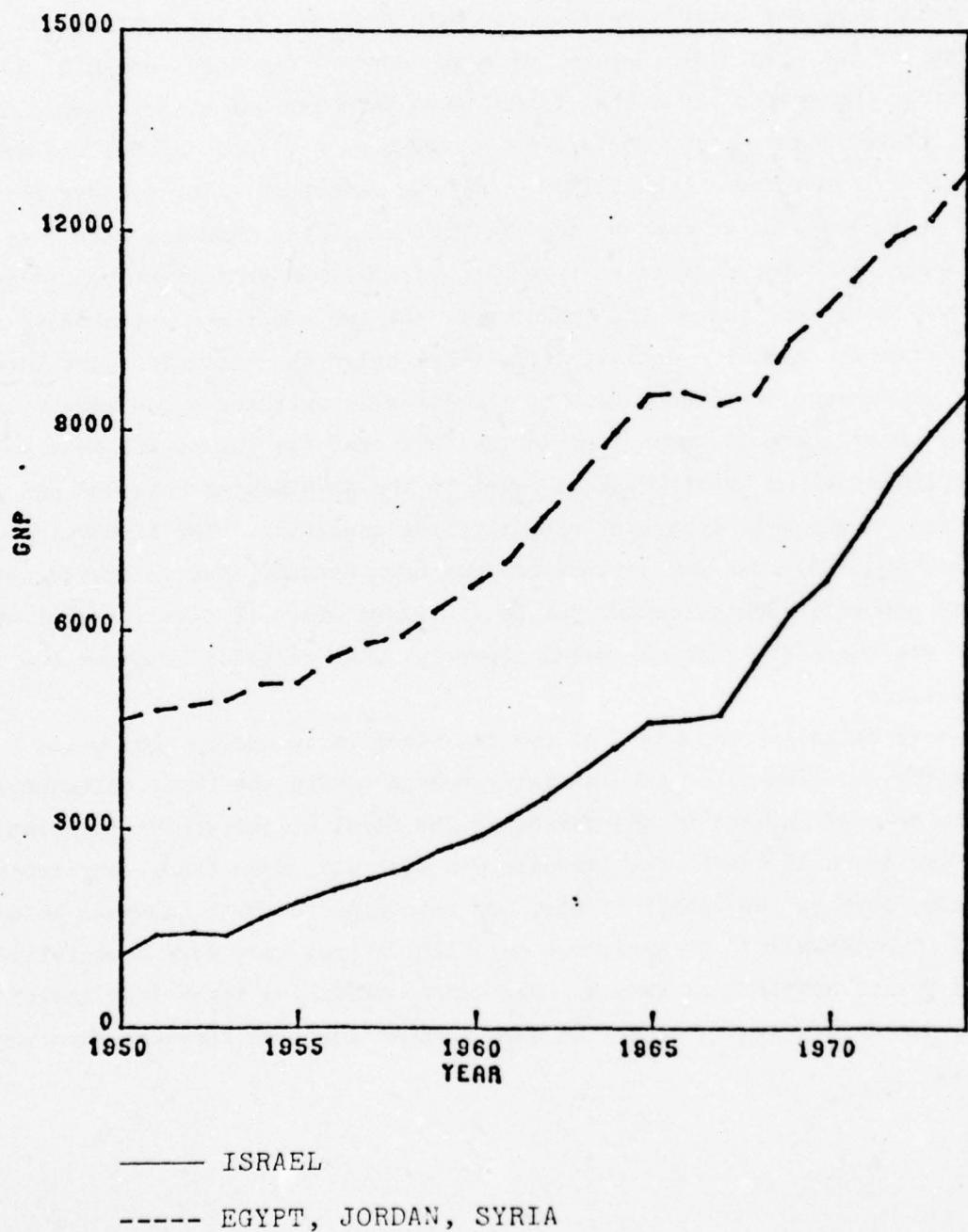
- H<sub>1</sub> The victor must possess a pool of capabilities at least equal or superior to that of the loser.
- H<sub>2</sub> If the two sides are at all times equal in capabilities, the result should be a draw.
- H<sub>0</sub> National capabilities are not systematically related to the outcome of war.

Findings.

We begin with the Arab-Israeli wars. If one compares the GNP of the two sides as the measure of national capabilities, the Arabs appear stronger than the Israelis by a substantial margin, (Graph 5, p.32). Indeed, Egypt alone has a commanding advantage over Israel throughout the entire period of repeated

GRAPH 5

NATIONAL CAPABILITIES OF ALL CONTENDERS IN MIDDLE EAST  
Measured by GNP (Millions of US \$)



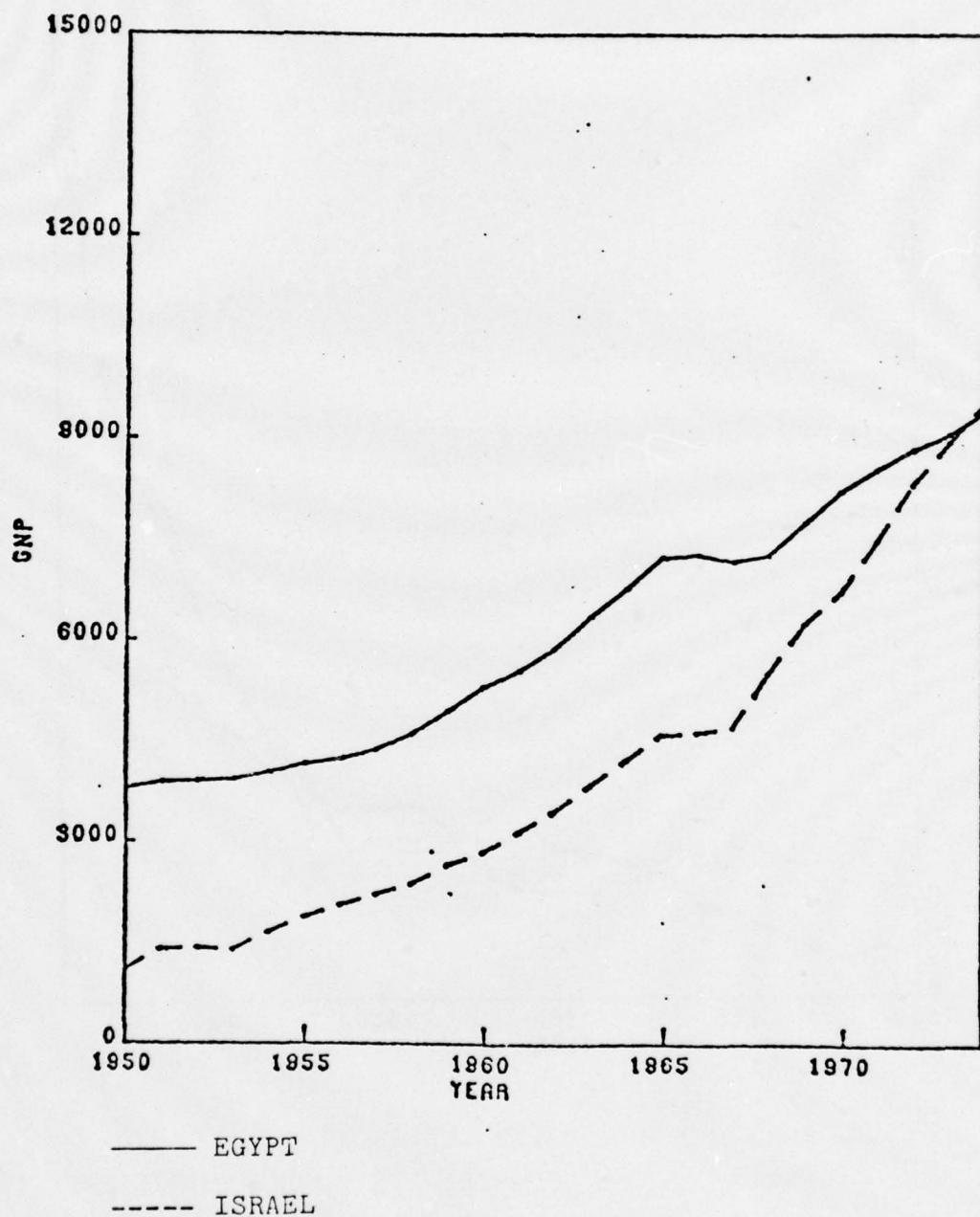
truces and wars that make up the history of the Middle East in the last three decades (Graph 6, p.34). We know such estimates of the power of the two countries to be wrong. Israel must be at least as strong as the Arab states combined, and stronger than the most powerful single member of the coalition. Otherwise, Israeli victories cannot be explained. This is precisely the calculation we obtain if we measure the strength of the two main combatants using the amended model. Two comparisons are made. One juxtaposes the performance of Egyptian and Israeli capabilities (Graph 7, p.35), and the other compares Israeli performance with that of the three principal combatants on the Arab side (Egypt, Syria and Jordan) combined (Graph 8, p.36). The first comparison shows that Israel surpassed the United Arab Republic in 1957, stayed ahead until 1967 and 1968, regained the lead in 1969 and gained sharply in every year through 1974, when our data ends. The picture shifts only minimally when we compare the performance of the Israelis with that of the three Arab opponents taken together. Israel passes the entire coalition one year after she passes the UAR alone. The two sides are quite close to each other for almost a decade, Israel dips below the coalition just before 1968; and then a pronounced gain of the Israelis over the Arabs appears.

Our major accomplishment lies in the fact that the new measurement portrays an Israel at least equal in power to the Arab States combined and superior to the most important member of the coalition. The distortion present when only GNP was applied has now been erased. Our validation method is not very sophisticated, but it is evident that if distributions of power are those that the new model suggests, what actually happened was predictable.

A more detailed comparison of the two sides is in order. Our model shows the Israelis to be substantially behind during the first quinquennium and to be still weaker in the period of the first military confrontation with the Arabs in 1956. The Israelis won that war, made sharp territorial inroads, gave up the spoils of war, and retreated to their previous boundaries. The Israelis, however, did not fight alone; they were powerfully aided by the British and French. One cannot therefore infer from their being on the victorious side that they were at the time stronger than the Arabs.

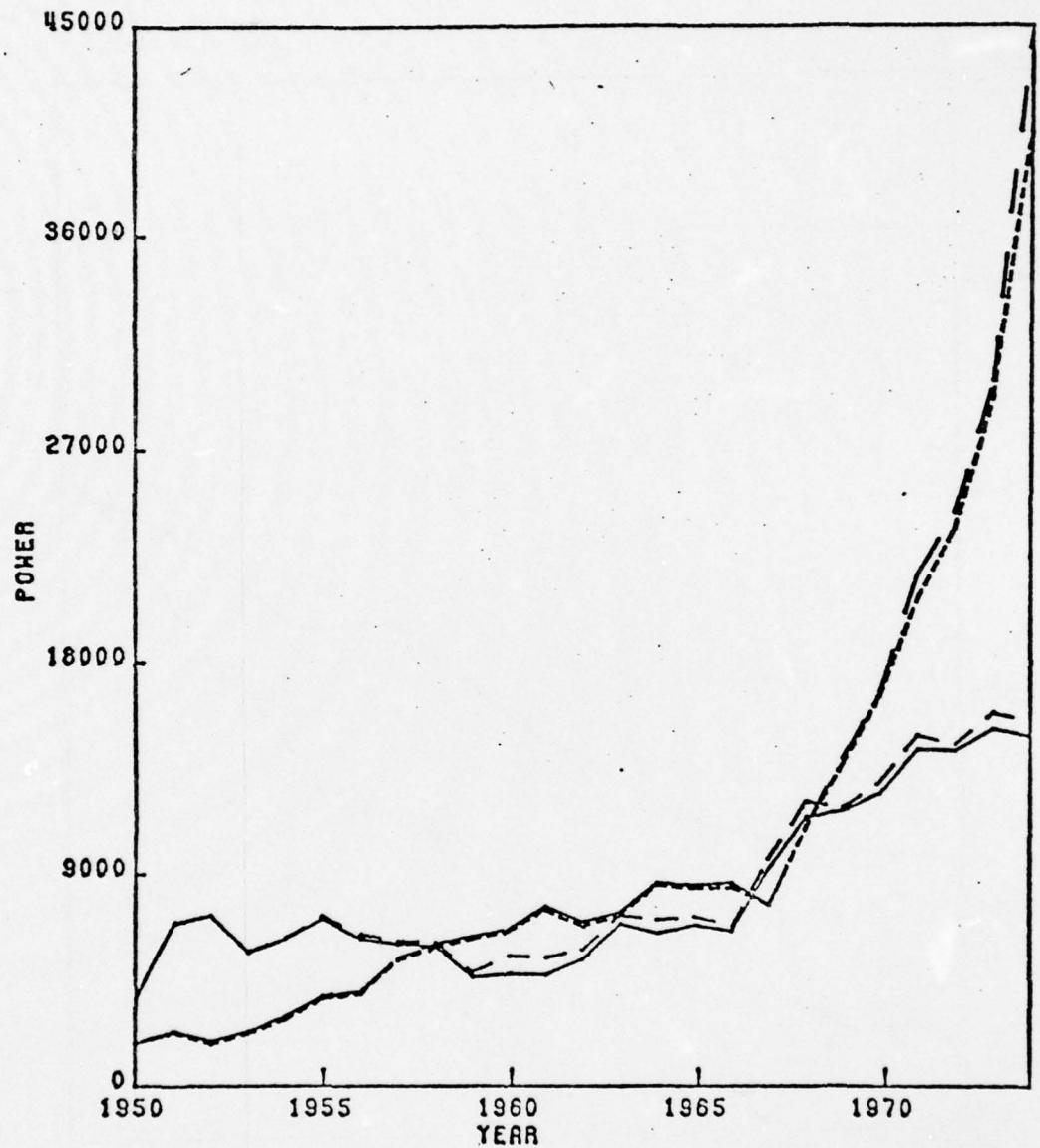
GRAPH 6

NATIONAL CAPABILITIES OF ISRAEL  
AND EGYPT MEASURED BY GNP  
(Millions of US \$)



- 36 -  
GRAPH 7

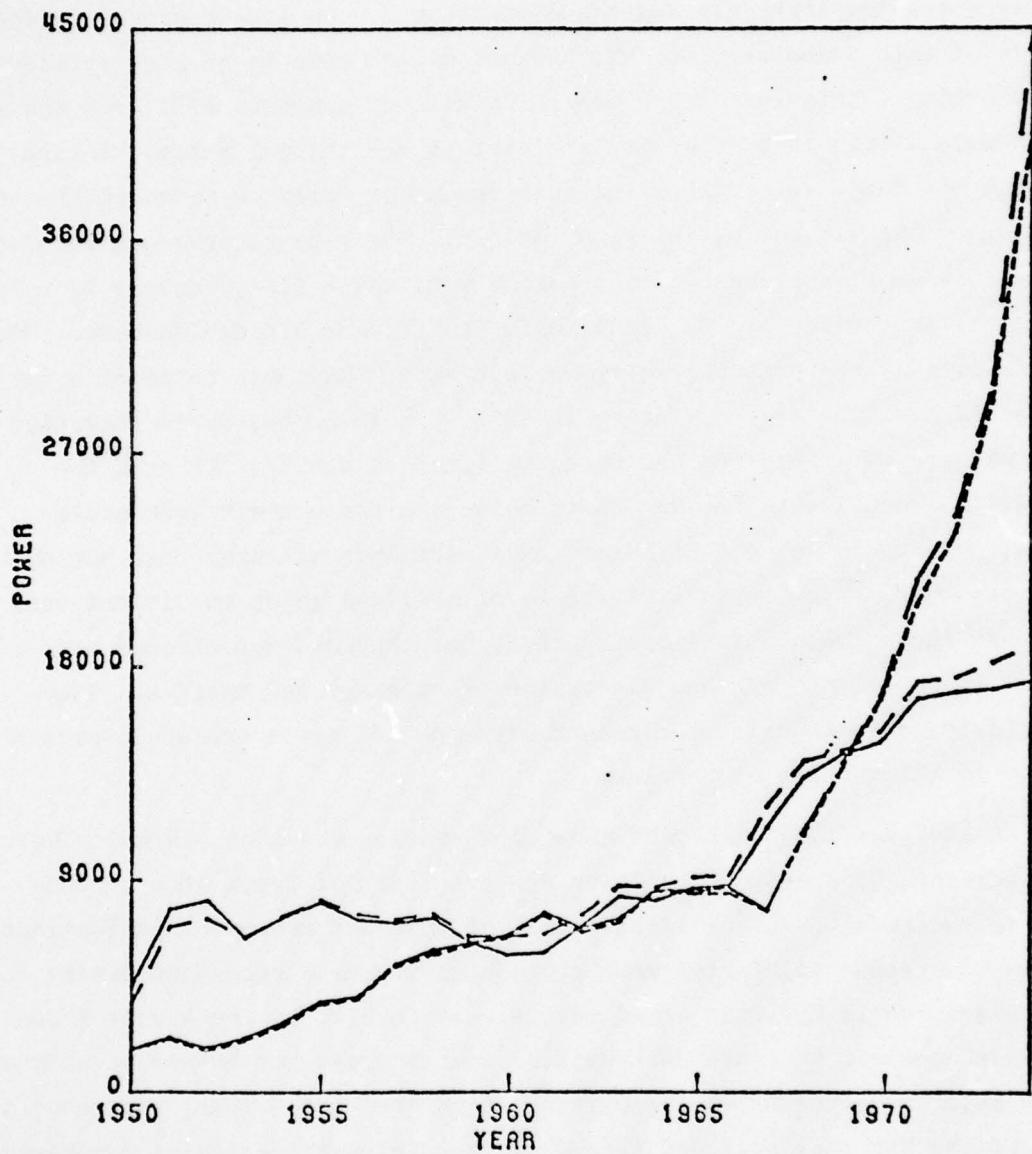
ISRAEL AND UAR NATIONAL CAPABILITIES  
INCLUDING FOREIGN MILITARY ASSISTANCE



- UAR--INTERNAL CAPABILITIES ONLY
- — UAR--INTERNAL CAPABILITIES + FOREIGN MILITARY AID
- ISRAEL--INTERNAL CAPABILITIES ONLY
- — — ISRAEL--INTERNAL CAPABILITIES + FOREIGN MILITARY AID

GRAPH 8

ALL CONTENDERS IN THE MIDDLE EAST  
NATIONAL CAPABILITIES OF COMBATING SIDES  
INCLUDING FOREIGN MILITARY ASSISTANCE



— UAR, SYRIA, JORDAN--INTERNAL CAPABILITIES ONLY

— — UAR, SYRIA, JORDAN--INTERNAL CAPABILITIES +  
FOREIGN MILITARY ASSISTANCE

----- ISRAEL--INTERNAL CAPABILITIES ONLY

— — — ISRAEL--INTERNAL CAPABILITIES + FOREIGN MILITARY  
ASSISTANCE

In 1967 and 1973, the two sides fought "alone." Our estimates show Israel equal to the Arabs in 1967 and much stronger in 1973. These findings are congruent with the actual outcome of the two wars.

We may, however, briefly speculate about a puzzling difference between the performances of the two sides in the two conflicts. Israel's action in 1967 was devastatingly swift and conclusive. We hypothesized, on the basis of this demonstration, that Israel would prove to be much stronger at the time. This is not the case. Israel won again in 1973, but had a much more difficult time of it, at least in the initial phase. Before seeing the data, we hypothesized that the Arabs would be shown still not so strong as Israel, but catching up rapidly. The very reverse was adduced. Israel is vastly stronger in the second war, while its advantage is only marginal in the first. We cannot offer an irrefutable explanation. Our guess is that the preemptive Israeli air attack had much to do with the ease and rapidity of the victory in 1967. In 1973, the Syrian-Egyptian forces were well prepared and were the first to attack. It took the Israelis some time to recover their poise and throw their adversaries back. One could argue that Israel had to be much stronger than her opponents to survive the initial attack of 1973 and go on to win the war. Perhaps these speculations are correct, but they are not offered here in order to enter into serious discussion of strategy and tactics. They are advanced to acquaint the reader with one of the important questions posed by the results we obtained.

In 1967 and 1968, our data show the Israelis dropping minimally below the strength of the Arab coalition and even that of Egypt alone. This dip is the result, in the first place, of post-war economic readjustment. As we understand it, Israel went through an economic recession during those two years, while Egyptian armed forces were rebuilt by the Soviet Union. Moreover the aid data are not compiled year by year but rather at points when major commitments by the patron nation are made. Thus, the rebuilding of the UAR that extended throughout the interwar period is compressed at the end of the conflict. The point is that the dip is an artificiality which resulted from the adjustments of the antebellum period, not an accurate portrayal of the capabilities of the two sides.

It seems fair to say that the evidence supports hypothesis one, that winners of military confrontations, will have national capabilities equal or superior to those of the losers.

The next conflict we used as a test case was the Vietnamese war. Let us state at the outset what we perceive to be the outcomes of the war. This should be phrased in two parts. If one views the conflict as a military struggle of the North Vietnamese and Viet Cong against the South Vietnamese, the result is the latter's unequivocal defeat. It seems accurate to suggest, however, that the result of the military struggle was quite different as long as American forces were in Vietnam. During the period, the result was a stalemate, with the Americans and South Vietnamese unable to dislodge their opponents, and the Viet Cong and North Vietnamese unable to gain hegemony over the whole of Vietnam because of American intercession.

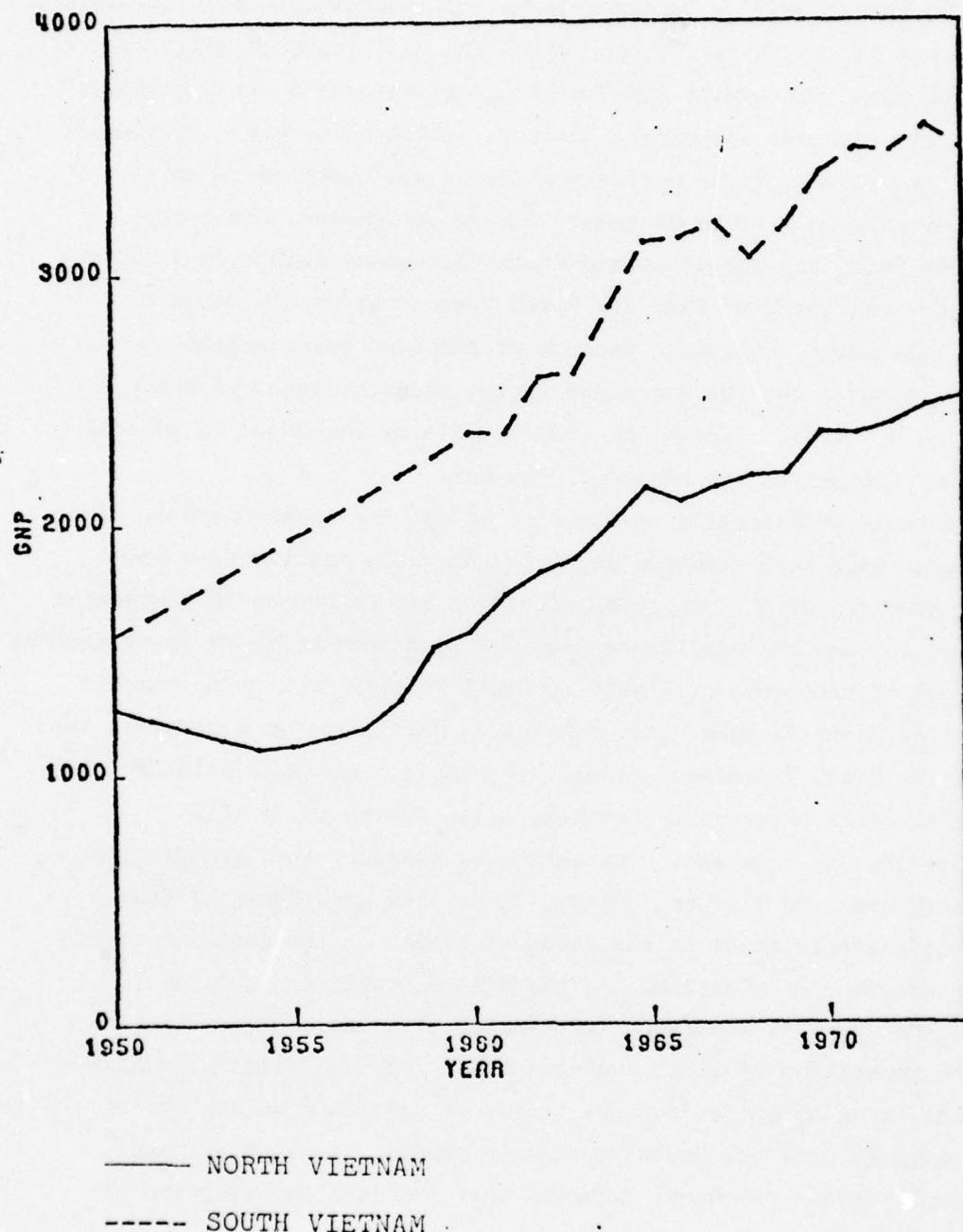
The GNP estimates for the two sides do not predict either of these outcomes (Graph 9, p.39). Indeed, the losing side is portrayed as substantially stronger throughout the period of the war.

The picture is dramatically reversed if we use the revised model. The North Vietnamese were much stronger until the American intervention began in earnest. American effort, in terms of direct aid to the South Vietnamese government, as well as the assistance provided by direct military intercession, brings the pool of resources available to South Vietnam to a point roughly equal to that of North Vietnam. After American participation decreases, the resources of the South Vietnamese plummet to a level they held prior to the onset of the American presence in Southeast Asia (Graph 10, p.40).

Some comments are required. Our estimates support, in a general way, the actual occurrence in Vietnam. Communist inroads into South Vietnam before 1966 left little doubt of the eventual result of the conflict, lest there was an outside intervention. As the United States brought new resources to the cause of the South Vietnamese, their adversaries also increased the generation of their own resources. The two sides were approximately equal in capabilities for the period of maximum American effort. At no time, however, did the South Vietnamese possess the overwhelming advantage which outside observers believed that American intervention had

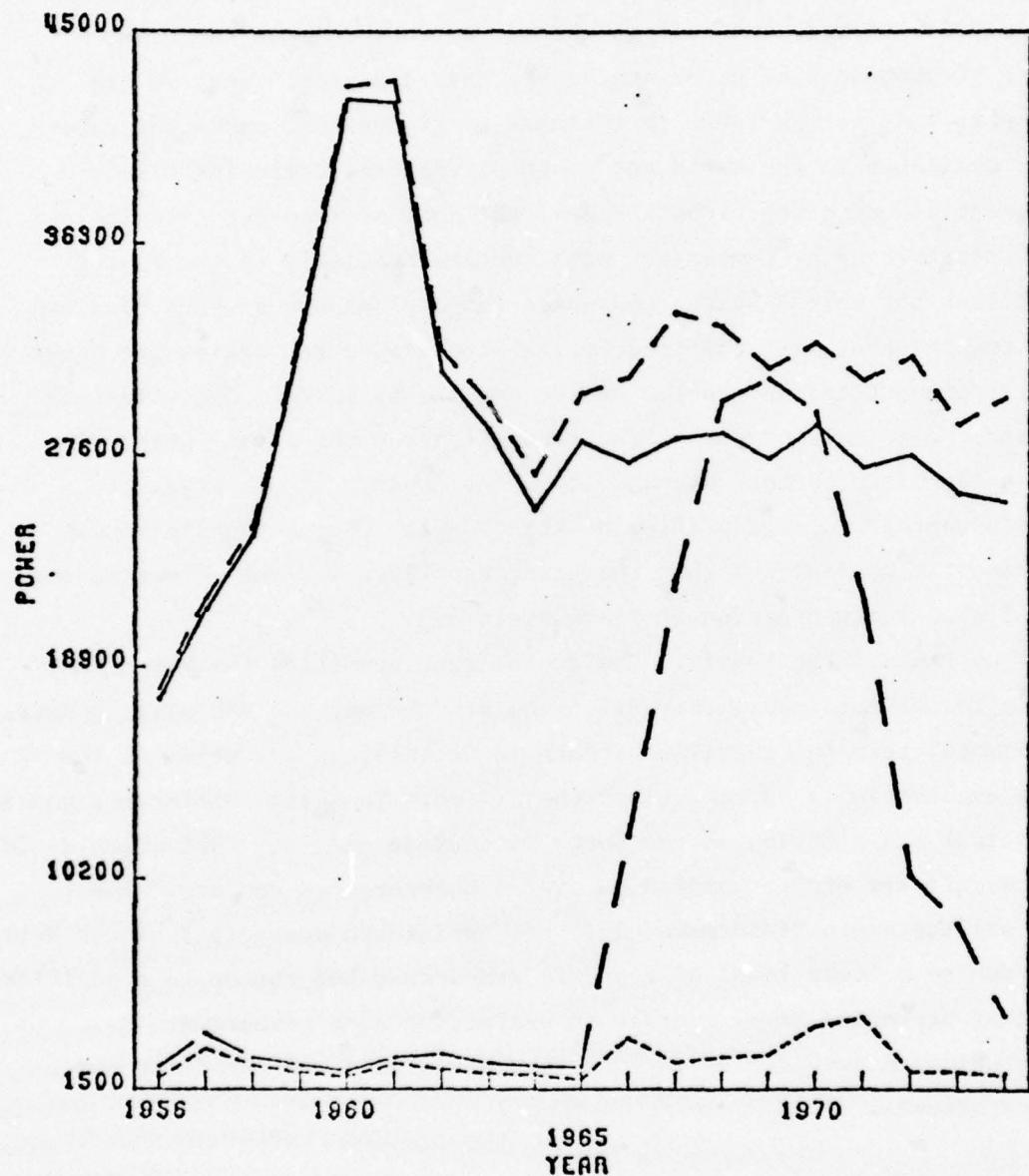
GRAPH 9

NORTH AND SOUTH VIETNAMESE NATIONAL CAPABILITIES  
AS MEASURED BY GNP (MILLIONS OF US \$)



GRAPH 10

NEW MEASURE OF NORTH AND SOUTH VIETNAMESE CAPABILITIES  
INCLUDING FOREIGN ASSISTANCE



- — N. VIETNAM--INTERNAL CAPABILITY ONLY
- — N. VIETNAM--INTERNAL CAPABILITIES + FOREIGN AID
- — S. VIETNAM--INTERNAL CAPABILITY ONLY
- — S. VIETNAM--INTERNAL CAPABILITIES + FOREIGN AID

brought to the war. On the basis of measures then in use, the performance of North Vietnam and the Viet Cong was inexplicable.

The point is often made that the United States could have conquered the North Vietnamese had it wished to do so; the United States did not bring to bear all its capabilities. In other words, it was not a total war. The claim is doubtless so from the standpoint of the Soviet Union as well, and for all the conflicts we have tested, save that of China and India in 1962. It begs the real question. We do not argue here that the North Vietnamese were as strong as the United States. What we are proposing is that if one seeks to estimate by traditional means the capabilities available to the North and South Vietnamese, including direct and indirect aid received by both sides, the pool of resources available to the North is tiny by comparison with the one available to the South. The fact that the United States possessed immense resources which remained uncommitted and that, if committed, might have tipped the scales the other way, is irrelevant to the problem we are seeking to solve. Our effort is to explain the actual outcome of the struggle given the distribution of resources committed by both sides. It is the essence of our argument that the advantage in capabilities of the US-South Vietnam coalition was more apparent than real and that the great equalizer was the effectiveness of the political organization of North Vietnam.

Let us restate the thesis. The factor that permitted the North Vietnamese to resist American intervention and win the war was not will, generalship, climate, terrain, guerilla-warfare techniques, or any other of the numerous excuses deployed to explain the fiasco. The vital difference was in the political organization of the North Vietnamese and Viet Cong which could sustain a military effort carried on over a quarter of a century. The reasons why the South Vietnamese could not resist the pressure from the North was not due to a lower level of economic resources, but rather to a political system that performed below average in extracting such resources.

The evidence provided by the war in Vietnam supports our first and second hypotheses.

As indicated, the Sino-Indian war of 1962 is the only conflict for which the GNP estimates of national capabilities accurately predicted the military outcome (Graph 11, p.43). When the estimates based on economic performance are corrected by measures of political development, the difference in capabilities transforms a Chinese advantage of two or three to one, to a superiority of from ten to fifty to one (Graph 12, p.44). The latter estimate, though startling, may be a far more accurate estimation of the strength of the two combatants, than the one provided by socio-economic measures. In any event, Chinese performance in that war suggests that the latter estimates are likelier ones. Our first hypothesis is again validated.

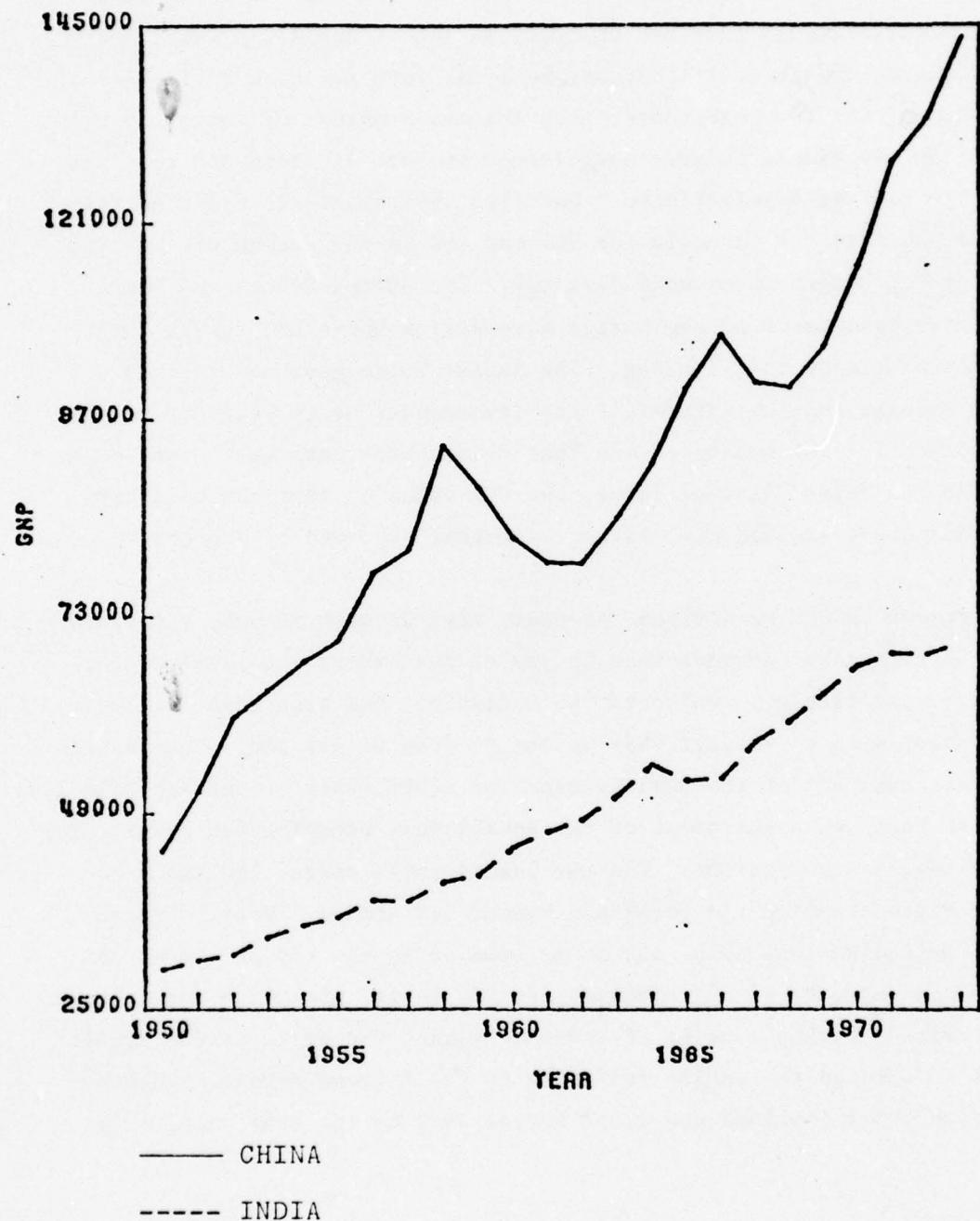
As happened in the struggle for Vietnam, so in the Korean war of 1950-1952, the great powers intervened directly. The United States and China not only gave assistance to the Korean governments but also brought their own troops to help in the fighting. The Soviet Union gave aid to both the North Koreans and the Chinese. The investments of these great powers were substantial. The number of men that China threw into battle was much larger than the United Nations force, but the value of American military material and other aid was much larger than that expended by the other side.<sup>15</sup>

The reader should be advised, however, that we were plagued with data problems in this case far more than in any of the others. Reliable information is not available. We had to use estimates, and even these were often not available; with the result that we had to draw up our own. The resulting data are thus not of the quality used for other tests. (See Appendix II).

Let us begin by a statement of the conflictual behavior our power estimates are supposed to predict. The war lasted three years. In the first year, the North attacked the South and routed its armies. With American and other United Nations help, the South held on to the tip of the Korean peninsula and then, by a bold American assault behind the North Korean lines, permitted by the landing at Inchon, evicted the North Korean armies and moved up through the entire peninsula to the Chinese border. Chinese intervention drove American and other forces back to the south and, after

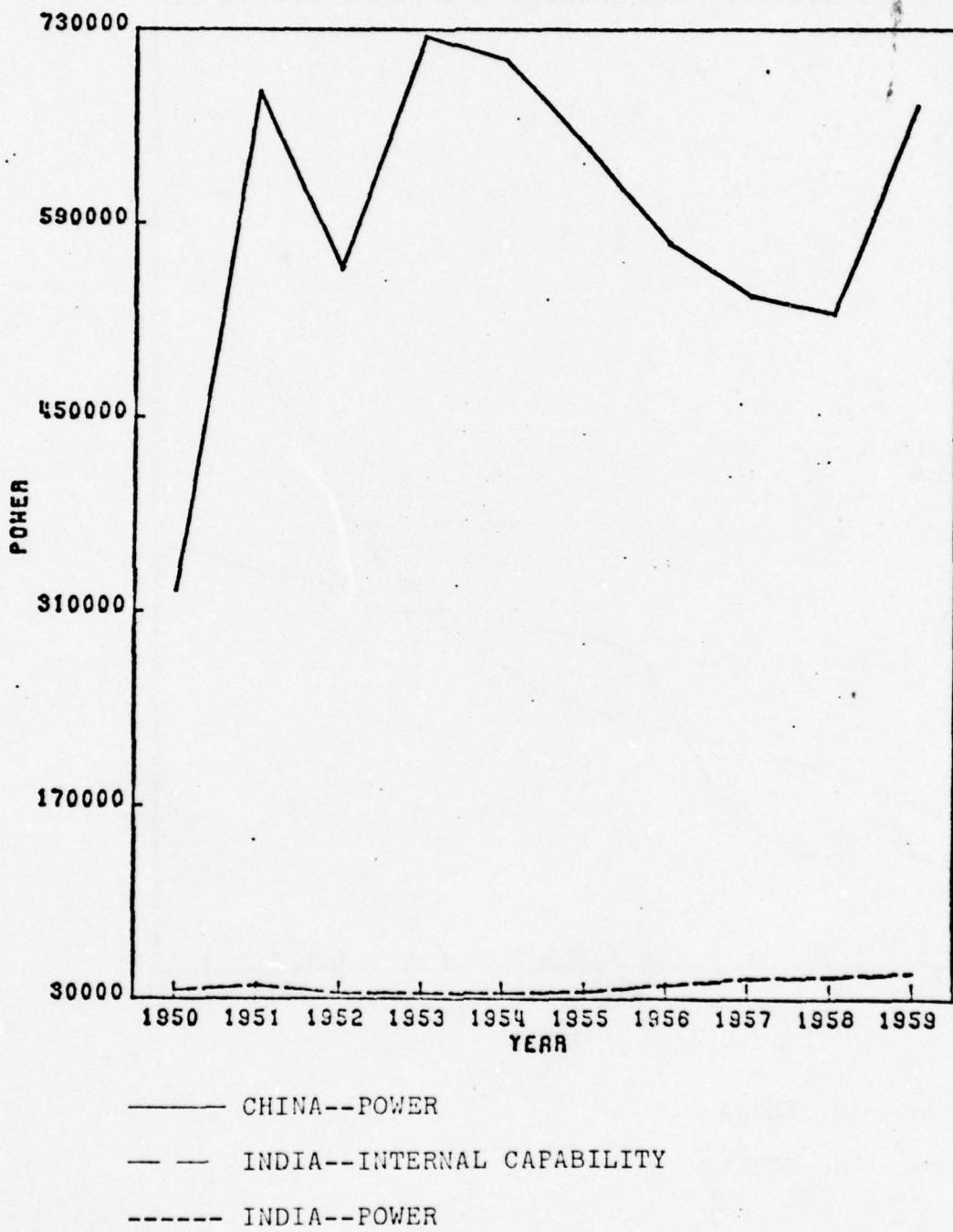
GRAPH 11

NATIONAL CAPABILITIES OF INDIA AND CHINA  
MEASURED BY GNP (MILLIONS OF US \$)



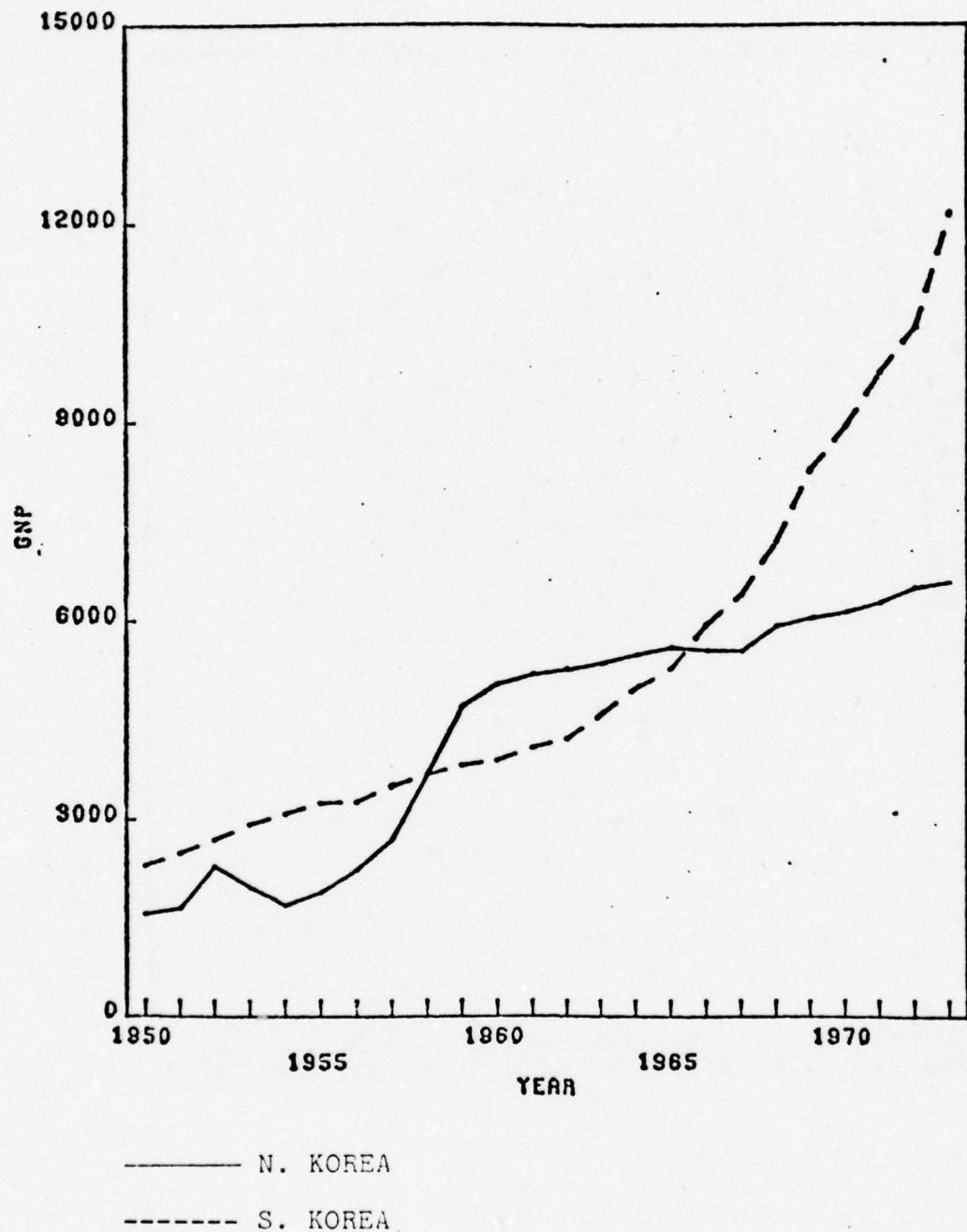
GRAPH 12

NATIONAL CAPABILITIES OF INDIA AND CHINA  
AS MEASURED BY NEW INDEX



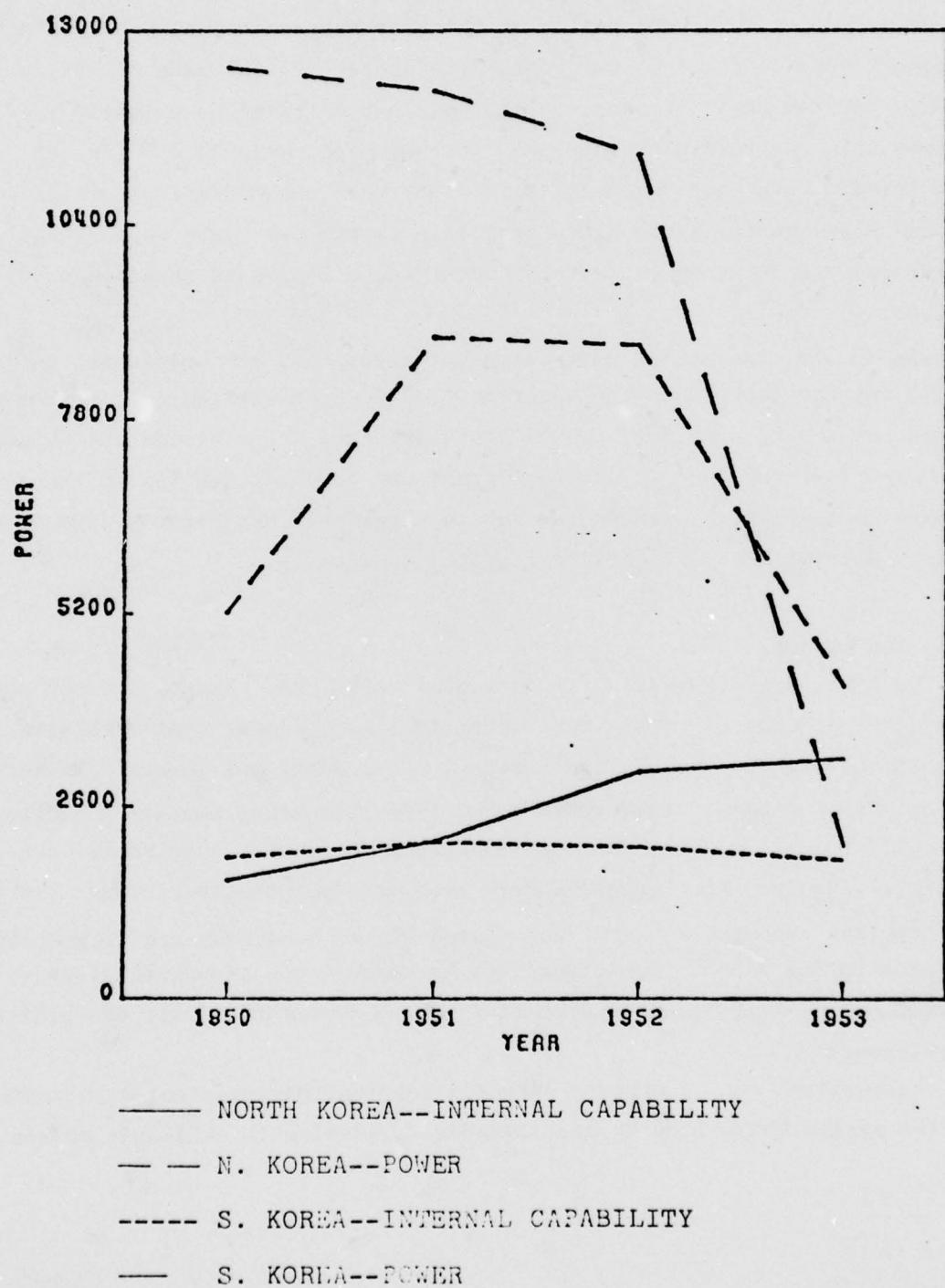
GRAPH 13

NORTH AND SOUTH KOREAN NATIONAL CAPABILITIES  
MEASURED BY GNP (MILLIONS OF US \$)



GRAPH 14

INTERNAL AND EXTERNAL CAPABILITIES OF NORTH  
AND SOUTH KOREA DURING WAR  
MEASURED BY NEW INDEX



a good deal more fighting, a stalemate was achieved on a line not significantly different from the one originally dividing Korea.

If GNP is used alone as a measure of power, it errs substantially in the evaluation of the situation (Graph 13, p.45). The adjusted model we propose offers much more satisfactory results (Graph 14, p.46). For the first year, the North Korean side appears much weaker than the South Korean. However, the various movements and interventions in the fighting by the great powers at different points in the year make calculations of relative strength very uncertain. Our measure reflects the stalemate of 1951 and 1952, when the North Korean coalition is estimated to be slightly less strong than the forces of the South Koreans; the ratio is 1.3 for 1951 and 1.2 for 1952. For our purposes it is plain that the estimation of the pool of human and material resources available to the two sides is basically equal and that if this estimate is accurate, a stalemate should have resulted.

As in the case of Vietnam, we do not argue that the United States could not have destroyed the adversary had it been willing to commit more resources to the conflict. While probably true, it is beside the point. The important question is whether or not our power estimation of the resources actually employed in the war is a reliable predictor of its outcome. Here we have validated our second hypothesis.

#### IV. CONCLUSION

We have posed two sets of fundamental questions. First, can one predict the outcomes of wars? More specifically, assuming that each side fights wholeheartedly, can one forecast the winners and losers? To date, no nation or national leader has known from the outset whether a particular war will be won or lost. We need look back no further than World Wars I and II. More recent examples come even more poignantly to mind: Korea, Vietnam and the Middle East. Our second set of questions was intimately related to the first: is it possible to measure the structural transformations of a political system that are so important a part of "political development?"

We believed that a measure directly tapping the political performance of the system would provide the ingredient, missing in available models

of national power, which would mitigate the volatility and inaccuracies of their behavior in critical cases. International trials of strength were viewed as national laboratory tests for the validation of measures of national capabilities. The selection of test cases also permitted a validation of our measure of political development.

A list of our findings should suffice at this point:

1. Existing measures of national capabilities evaluate inaccurately the strength of the contestants in three of the four conflicts we have studied. Given the outcomes of these wars, estimates that South Vietnam was stronger than the North, that South Korea was stronger than the North, and that the Arabs were stronger than the Israelis were obviously erroneous.

2. The deficiencies of existing measures are corrected when one combines socio-economic indices with direct measures of political performance. The correction that this political index introduces into overall models of national capabilities is substantial. The estimates of previous measures are completely reversed. If one calculates political performance, North Vietnam with Russian and Chinese aid, becomes as strong as South Vietnam, in spite of the American intervention. The stalemate resulted because the North alone was much **stronger** than the South alone. When the Americans withdrew, any hope that South Vietnam could survive, or that the Northern tide, at the end of the struggle, would be even briefly stemmed with renewed American aid, is revealed to be false. The fact that the North Vietnamese as well as their enemies were surprised by the rapidity of the South Vietnamese collapse was further indication of how primitive is the process of evaluation of the strength of nations by those responsible for their security.

3. We have found great similarity in the outcome of the Korean war. Once one introduces a calculation of the performance of the political systems of the two combatants, the Sino-Korean coalition is almost equal in strength to the Korean-American combination. Again, the stalemate that followed Chinese intervention is wholly congruent with our data.

4. Our new model of national capabilities shows the Israelis stronger than the Egyptians from 1955 to the present, and stronger than the entire

Arab coalition as well. In view of the results of the military confrontations which the Israelis won decisively, our estimations seem reasonable.

5. As noted in the case of the Sino-Indian war, socio-economic measures do indicate the Chinese to have been stronger than the Indians. Our new measure magnifies the difference in the predicted direction.

A number of other points should be mentioned.

Measuring political development using the extraction of resources, offered excellent results. Estimating a government's development by considering its performance in utilizing resources available in its socio-economic system and by comparing it with the performance of other countries seems to offer a valid measure of the effectiveness of each system. It should permit useful intercountry comparisons at one point and over time. The significance of this new capability should not escape the reader.

Comparisons of the strength of nations have been possible during times of conflict, and verifications of estimates have been found in the results of war; using the assumption that the losers were weaker than the winners. The measure we present here, however, permits empirical comparisons of the capabilities of countries in times of peace, before wars actually begin.

It has long been known that armies and weapons are at best an intermediate variable in the outcomes of military conflicts, and that wars are won on the production line. This partial truth has been pleasing to the economic determinists of the industrial world. But evidence now suggests that political arrangements may be as important as economic productivity and that the two do not necessarily go hand in hand. A nation may score poorly on economic productivity and well on political effectiveness.

We should also observe that our measures do not probe popular support for a government. One cannot exclude the possibility that a political system may score high on effectiveness but low in the support a population may willingly give its governmental leaders. To assume one from the other involves an inferential leap useful for propagandists but dangerous for scholars.

Our findings are not entirely unexpected. After all, the outcomes of the conflicts in question have been known and the reasons for them suspected. What we have found, nevertheless, flies in the face of intuition, as indeed did the results of the wars we studied. This study should erode further the belief that what is important cannot be measured and that what can be quantified is not important, and the notion that in the primitive field of internal politics (or political development), the intuition of experienced and responsible leaders can entirely obviate the need for more rigorous procedures.

#### APPENDIX I. INDEX OF POLITICAL DEVELOPMENT

Studies of tax effort by fiscal economists, especially Raja Chelliah and Roy Bahl, provide the methodological background of the paper.<sup>16</sup> The use of variations in tax ratios to account for meaningful intercountry differences in the size of the public sector, obscures the fact that rich nations can extract more because they have a larger base to tax. The estimation of tax capacity and control for the differences in available resources is a preliminary step to the estimation of tax effort. Real tax ratio (T/GNP) is the quotient of total taxes collected by the government over total output. Taxable capacity is the revenue collected given available resources relative to other nations in the system. It is calculated by the predicted values ( $\hat{T}/GNP$ ) obtained by regressing the real tax ratio against economic indicators of differences in resource base. Finally, the tax effort index (that theoretically reflects differences in political extraction among nations) is the quotient of real tax ratio to estimated tax capacity. This appendix is devoted, almost exclusively to the methodological problems encountered in the derivation of the tax effort index.

##### Tax Capacity: Alternate Models

Regression techniques were used to control for differences in taxable resources among nations. Several equations had been proposed as the best representation of tax capacity. The two most widely utilized and refined are:

1.  $TAX/GNP = A + B_1 \text{ EXPORTS/GNP} + B_2 \text{ AGRICULTURAL PRODUCTION/GDP} + B_3 \text{ MINERAL PRODUCTION/GDP} + \text{ERROR}$
  
2.  $TAX/GNP = A + B_1 \text{ GNP/TOTAL POPULATION} + B_2 \text{ NON-MINERAL EXPORTS/GDP} + B_3 \text{ MINERAL PRODUCTION/GDP} + \text{ERROR}$

We chose equation one for a number of reasons. The time series for the independent variables are more complete and reliable for the first equation.

This is particularly true for non-mineral exports that fluctuate unexpectedly from year to year, due to major changes in reporting. Also, in the case of developing countries, agricultural production measures directly the proportion of total output that is extremely difficult for governments to tax; while GNP per capita used in equation two does not directly reflect this component. Finally, the results obtained from both equations are very similar, but, generally equation one provides more stable coefficients and predicted values. This is congruent with our apriori expectation of the way a political development indicator would behave.

## Measurement Error

Previous studies utilized three years moving averages to minimize the year to year fluctuations in the indicators caused by financial fluctuations and, more importantly, by inconsistent reporting. Because a complete time series is now available we controlled for fluctuations by pooling the time series and introducing directly a time component to detrend the equation. The resulting equation is as follows:

TAX/GNP = A + B<sub>1</sub> TIME + B<sub>2</sub> EXPORTS/GNP + B<sub>3</sub> AGRICULTURAL PRODUCTION/  
GDP + B<sub>4</sub> MINERAL PRODUCTION/GDP + ERROR

where:

Pooling improves the consistency and efficiency of estimates. Comparisons of time series estimates with those obtained from year by year estimations produced coefficients that in most cases are within the confidence interval of those obtained in the time series (see Table 3, p.53). Note that prior to 1973, very few coefficients obtained from the cross sectional regressions fall outside the 95 percent confidence interval obtained from the pooled model. Major deviations occur only for the Exports coefficients in 1966 and for the Mining/GDP for 1957 and 1971. The increased instability for 1973 and 1974 results mainly from the differences in the sample on nations used in the estimation because of drastic reductions in data availability that also prevent cross sectional estimates for 1950-1953.

TABLE 3. CONFIDENCE INTERVAL TABLE

95 percent confidence interval on coefficients from pooled model	Coefficients from Cross-Sectional Model																				
	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
$\beta_2$ : (.062 , .194)	.17	.22	.16	.12	.17	.19	.20	.19	.17	.15	.11	.04	.07	.09	.07	.05	.08	.02	-.005	.07	
$\beta_3$ : (-.189 , -.098)	-.15	-.17	-.13	-.14	-.11	-.08	-.07	-.09	-.11	-.14	-.16	-.16	-.19	-.15	-.16	-.18	-.18	-.17	-.20	-.24	-.30
$\beta_4$ : (.021 , .217)	.07	.15	.13	.01	.80	.09	.12	.14	.07	.12	.13	.17	.14	.19	.17	.15	.17	.32	.17	.10	-.02

Where coefficients are for

- 2 export/GNP
- 3 agricultural production/GDP
- 4 mining production/GDP

The confidence intervals in the left hand column are derived on the basis of estimates taken from the pooled model. The numbers in each subsequent column to the right are the value of coefficients taken from the cross-section regression one year at a time. For example, the first value (.17) under year 1954 is the regression coefficient  $\beta_2$  for the cross-section model for that year. It is contained in the confidence interval (.062 , .194) of the parameter  $\beta_3$ .

Tax capacity values, measured by predicted values (TAX/GNP), are also very close to those obtained in the year by year estimates; but they do not fluctuate drastically in years when the sample of nations is reduced. The trend in the series is positive and large. This reflects the fact that most developing nations have increased governmental participation in all phases of economic life, partly as a result of increasing complexity of developing economies but probably largely as a consequence of socialization and centralization of governmental activities as governments take a direct role in the economic life of nations. Thus, the index of taxable capacity obtained from the pooled time series regression are stable over time. An added advantage -- not exploited thus far -- is the possibility of extrapolating directly future points for short time periods.

#### Centralized Economies

There are profound differences between the taxation systems of nations with centralized and open economies. In open economies governments extract resources by taxing directly or indirectly income from industry, commerce, labor, and agriculture. On the other hand, in centrally controlled economies governments extract resources by taxing directly or indirectly profits from nationalized industries, by controlling labor salaries and by centralizing the purchasing and selling of industrial and agricultural commodities. There is no need, therefore, in centralized economies to tax either mining operations or exports and imports. Thus, the inclusion of Communist nations in the sample (China, North Vietnam and North Korea), affected drastically the coefficients for exports and mining, reversing the signs and rendering the estimation insignificant. Clearly two models are at work within the same equation. Given the number of available cases, the simplest solution was to incorporate a dummy variable for the different types of economies and determine its effects. We proceeded as follows:

$$\text{TAX/GNP} = A + B_1 \text{ TIME} + B_2 \text{ TYPE OF ECONOMY} + B_3 \text{ EXPORTS/GNP} + \\ B_4 \text{ AGRICULTURAL PRODUCTION/GDP} + B_5 \text{ MINERAL PRODUCTION/GDP} + \text{ERROR}$$

where:

0 = Open Economy

TYPE OF ECONOMY

1 = Centralized Economy

With this dummy coefficient, we obtain stable, statistically significant and theoretically acceptable results. To assure that the coefficients for all countries were stable, we added interactive terms, first for time, with each independent indicator, then for open and closed economies with each independent indicator, and, finally, in combination. The more complicated formulations were not justified. Changes in slope over time did not materialize; and results were insignificant. Similarly, changes in slope for independent variables were not present with the case of centralized economies alone. The simplest equation was clearly the most appropriate given our data restrictions.

Estimation of Tax Capacity

The final estimation replicates closely the findings of previous studies on this subject despite our more limited sample. The results can be summarized as follows:

TABLE 4

STATISTICAL ESTIMATION OF  
TAX CAPACITY

ANALYSIS OF VARIANCE OF REAL TAX RATION N = 909 OUT OF 988

SOURCE	DF	SUM SQRS	MEAN SQR	F-STAT	SIGNIF LEVEL
REGRESSION	5	31790.	6358.0	249.04	0.
ERROR	908	23054.	25.530		
TOTAL	908	54843.			

MULT R = .76 R<sup>2</sup> = .580\* Std. Error = 5.05

VARIABLE	PARTIAL	COEFF	STD ERROR	T-STAT	SIGNIF LEVEL
CONSTANT		11.655	.71290	16.349	.0000
TIME	.29653	.23024	.024677	9.3302	.0000
TYPE OF ECON.	.70775	23.869	.79286	30.105	.0000
EXP/GNP	.20939	.12838	.019950	6.4349	.0000
AGR PROD/GDP	-.32287	-.14291	.013941	10.251	.0000
MIN PROD/GDP	.13322	.11898	.029455	4.0393	.0001

\*R<sup>2</sup>, control for the degrees of freedom, given our sample size remains unchanged. (R<sup>2</sup> = .577) IMF studies relied on these measures because of more restricted samples.

First, the forty percent of the variance that is not explained we attribute to political, rather than economic capabilities. These numerical results are very similar to those obtained by previous estimates.<sup>17</sup> Second, the magnitude of the coefficients indicate strong effect of all independent variables on the tax ratio and affect the estimation in the predicted direction. Thus, the coefficients for agriculture is negative, indicating the difficulty of extracting resources from subsistence economies; while the coefficients for exports and mining are positive indicating a rise in the tax extraction as expected; and the dummy coefficient for centralized economies is strong and positive indicating the pervasive intervention of government into economic activities. All results are significant.

#### TAX EFFORT INDEX

The tax effort index is simply a quotient of the real tax ratio and tax capacity.

Thus:

$$\text{TAX EFFORT} = \frac{T/\text{GNP}}{\hat{T}/\text{GNP}}$$

If the real effort of the nations is larger than the tax capacity, the tax effort adopts values larger than 1, when they are identical the value is 1, and when the tax capacity exceeds real tax, the ratio is smaller than 1 but larger than 0. This index is, therefore, an excellent interactive indicator.

We submit that the deviations from the regression line indicate levels of national political capacity rather than insufficient specification of measurement error. This point is critical. We believe that the political capacity of developing societies is reflected directly in the ability of these nations to extract resources in proportion to their economic capacity. We also believe that the major portion of the error term is accounted for by political components. Thus the measure we propose is an indirect measure of political development.

The application of ordinary least-squares estimation procedure on the pooled (time series of a cross-section) model is justified if one satisfies

some basic assumptions about the error term  $\epsilon_{it}$  where  $i$  stands for country, and  $t$  for time. The error term may be decomposed into two statistically independent parts: a country specific effect and a remainder.

$$\epsilon_{it} = u_i + u_{it}$$

It is assumed that:

$$EV_{it}u_{i't'} = \begin{cases} \sigma_v^2, & i=i' \text{ and } t=t' \\ 0, & \text{Otherwise} \end{cases}$$

$$EU_iu_{i'} = \begin{cases} \sigma_u^2, & i=i' \\ 0, & \text{Otherwise} \end{cases}$$

This rules out autocorrelation among residuals for each country, covariation between residuals for different countries, and correlation between country specific error components over different points in time.<sup>18</sup> We tested for autocorrelation among residuals for the sampled countries and discovered no serious problem (at worst, the Durbin-Watson statistic showed indecisive tests for very few countries). The problem of covariation between residuals of different countries can be safely ruled out on theoretical grounds. If one assumes that the taxable capacity variables are exhaustively specified, then the effect of the tax effort variables, which are not specified in the model, would be absorbed by the error term. If the error terms for the different countries were correlated, the systematic element, tax effort factors, of each country's error term would have a similar effect on the tax performance of each country over time. This however, is not the case; each country's tax effort over time is affected primarily by domestic, idiosyncratic factors such as, public demand, or fiscal controls, which covary only by remote chance with another country's tax effort patterns.

APPENDIX II DATA

SAMPLE: SIZE AND COMPOSITION.

The sample used is not random because data for many developing nations are not available over time. All nations involved in international conflict were combined with those used in prior studies of tax effort producing a sample of 75 nations; of these, 38 had sufficient data for the entire period. We retained, whenever possible, nations that represent different geographic regions, economic systems and political regimes. The list of nations is as follows:

<u>NATION</u>	<u>YEARS</u>
Brazil	1950-1974
Bolivia	1950-1974
Burma	1950-1974
Chile	1950-1974
China, People's Republic of	1950-1974
Colombia	1950-1974
Costa Rica	1950-1974
Ecuador	1950-1974
Egypt	1950-1974
Ethiopia	1950-1974
Ghana	1950-1974
Guatemala	1950-1974
Greece	1950-1974
Honduras	1950-1974
India	1950-1974
Indonesia	1950-1974
Iran	1958-1974
Iraq	1950-1974
Ireland	1950-1974
Israel	1950-1974
Jordan	1950-1974
Kenya	1950-1974

Korea, North	1950-1967
Korea, South	1950-1974
Lebanon	1950-1973
Mexico	1950-1974
Nigeria	1950-1974
Peru	1950-1974
Philippines	1950-1974
Portugal	1950-1974
Sri Lanka	1950-1974
Syria	1950-1974
Taiwan (China, Republic of)	1950-1974
Thailand	1950-1974
Tunisia	1973-1974
Turkey	1950-1974
Vietnam, North	1956-1974
Vietnam, South	1956-1974

DATA: SOURCES AND ESTIMATES.

The collection of components utilized in this study relies on a variety of published and unpublished sources. Most are obtained from the World Bank, the International Monetary Fund and the Agency for International Development, but some are obtained from other U.S. governmental sources and individual monographs. In the following pages we describe each component with its sources and adjustments.

1. Population

Total population figures are mid year estimates obtained for all nations from the World Bank, Socio-Economic Data Bank, revised 10/13/1975. There are no missing data.

2. Total Output: Gross National Product (GNP) and Gross Domestic Product (GDP).

Two measures of gross product are used. Gross National Product (GNP) is a measure of the total domestic and foreign output claimed by residents of a country. Gross Domestic Product measures the total final output of a country including all goods produced and services rendered within its territory by residents and non-residents, without regard for allocation among domestic and foreign claims. The difference between GDP and GNP is the net factor income from abroad.

Gross Product in national currency and in constant dollars are from the World Bank, Socio-Economic Data Bank revised 10/13/1975. Data are available for all nations in the sample in approximately 90 percent of all cases between 1950-1974. All calculations are based on market prices and include compensation of employees, operating surplus, provisions for the consumption of fixed capital and indirect taxes less subsidies to producers. Conversions to U.S. dollars are obtained first by converting domestic currencies into average 1965-1971 U.S. dollars on the basis of weighted averages 1965-1971 prices and exchange rates, and then into 1972 U.S. dollars by means of the implicit U.S. GNP deflator for 1972 (base period 1965-1971). (See World Bank Atlas, Washington, IBRD, World Bank Atlas 1972: A Technical Note on the Computation Method, Washington, IBID, February, 1973).

Most of the missing data are to be found in 1974 and between 1950 and 1955. Gaps in the time series were estimated in two ways. When complete information was available for only GNP or GDP, missing years were estimated using five contiguous, overlapping years as following:

$$\text{GNP/CAPITA} = a + b \text{ GDP/CAPITA} + \text{ERROR}$$

Predicted values for the dependent variable were inserted into the missing points after a careful check for continuity. In most cases the accuracy of the prediction could be checked because data at five year intervals were available. Further, the cross-correlation between the two series is very high ( $R^2 = .99 - .94$ ) for short overlapping periods, and estimates for most overlapping extreme points were within 5% of the real values. In very few cases, neither of the two series was available. Extrapolations based on five contiguous years were used to estimate three to four years as follows:

$$\text{GNP/CAPITA} = a + b \text{ TIME} + \text{ERROR}$$

As in the previous case, predicted values were inserted into missing years. Very few points were estimated by this procedure, and in most cases, extreme values were available to cross-check results. Some exceptions are to be found prior to 1953 and for 1974.

### 3. Agricultural Production

Agricultural production estimates (in national currencies) the contribution of farming, livestock, forestry, fishing and hunting. It is obtained from the World Bank, Socio-Economic Data Bank, revised 10/13/1975. For many nations data between 1950-1960 is limited to point estimates for 1950, 1955 and 1960. We utilized three adjustment procedures. First, data for 1953-1955 were available from the collection by Raja Chelliah, and Margaret Kelly of the International Monetary Fund. These points were incorporated into the World Bank series. Arthur House and Ines Garcia collected supplementary points at the World Bank for some of the still missing nations. Finally the remaining missing points were estimated using:

Agricultural Production/GDP = a + b TIME + ERROR

To minimize distortions we utilized the first five continuous years in these estimates and inserted predicted values when they corresponded closely to the existing point estimates. The agricultural ratio was used because it is much easier to evaluate the fluctuations of the series in relation to total output.

4. Mineral Production

Mineral production, including minerals, quarrying, petroleum and natural gas, in national currency is from the World Bank, Socio Economic Data Bank revised 10/13/1975. This series is very similar to Agricultural Production in its availability. We utilized the additional collection of Raja Chelliah et. al. and Arthur House et. al. and estimated remaining missing points by a procedure similar to that described for Agricultural Production. For a few nations data was not available because mining was included into manufacturing, and we utilized national sources for the estimates. They were:

Israel 1950-1975.	From State of Israel, <u>Statistical Abstract</u> (yearly) For compatibility, GDP figures in the abstract were utilized as the base and the ratio of mining to total output was inserted directly.
Ireland 1950-1970.	Value of mining is minimal. National statistics do not carry this breakdown, but indicate that accounts for approximately 1 percent of total.
China, People's Republic of 1950-1959.	From Robert M. Field, "Civilian Industrial Production in the People's Republic of China: 1949-1974," Joint Economic Committee Congress of the United States, <u>China: A Reassessment of the Economy</u> , July 10, 1975 (GPO, 1975), p. 161.

5. Tax

The bulk of the data is obtained from the World Bank, Socio-Economic Data Bank revised 10/13/1975. We also relied very heavily on the more refined collection of the International Monetary Fund by Chelliah, and Kelly specifically designed for the evaluation of tax performance. Our confidence in the IMF collection is high because each point was independently checked by desk specialists and many components -- either missing or not presented

in the more aggregated World Bank collection -- are broken down into detailed sections.

The IMF collection consists of three separate short time series: 1953-1955, 1965-1967 and 1968-1971. For these years the following breakdown is available:

Income and profits

- a. Company
- b. Personal

Poll and Personal Taxes

Property Taxes

- a. Real Estate and Net Wealth
- b. Property Transfers
- c. Death and Gifts
- d. Motor Vehicles
- e. Other

Taxes on Production and Consumption

- a. Excises
- b. Fiscal Monopoly Profits
- c. Sales Taxes
- d. Lotteries
- e. Others

Taxes on International Trade

- a. Import Duties and Taxes
- b. Export Taxes
- c. Profits of Marketing Boards
- d. Exchange Profits and Taxes
- e. Other

Social Security Taxes

Other Government Revenue not Elsewhere Classified

Lotteries

The IMF group excluded Lotteries and Social Security Taxes from total taxes. The World Bank data was broken down into two distinct aggregations:

Income Taxes

Sales Taxes

Custom Duties

Profits of Fiscal Monopolies

Other Tax Revenue

Receipts from Government Enterprises

Other Non-Tax Revenues

For compatibility, we excluded from this breakdown Other Non-Tax revenues and Other Tax Revenue.

The second aggregation available for most countries contained the following breakdowns:

Direct Taxes on Household

Social Security Taxes

Other Direct Taxes on Household

Direct Taxes on Corporations

Indirect Taxes

Non Tax Revenue

From this aggregation we excluded Non Tax Revenues and Social Security Taxes.

In most cases the three estimates were within one or two percent of each other. For a few nations, social security taxes were not reported and we adjusted them using the IMF series.

We followed the IMF study in considering a fiscal year to be a calendar year if it closed in the first six months. And the following year if it closed after that. This procedure causes some distortions but is consistent over time. Some of the nations in this study, especially those involved in conflict were not included in either the World Bank or the IMF collections. We collected them and supplemented others as follows:

Egypt 1954-1964. From Jorgen Lotz, "Taxation in the United Arab Republic (Egypt)," International Monetary Fund Staff Papers, 12,1 (March 1966) pp. 126-127.

China, People's Republic. Senator Proxmire's Office, U.S. Senate, "Notes on Statistics Provided for China, North Korea, and North Vietnam," 1975.

Vietnam, North 1955-1963. From "DRV Fiscal System (Area Handbook)", in History of Vietnam War on Microfilm file DRV Subject ECON, data 67, sub-cat FIS. Collected by Douglas Pike. Also from Senator Proxmire's office, U.S. Senate, "Notes on Statistics Provided for China, North Korea and North Vietnam," 1975.

Korea, North 1950-1960. From Yoon T. Kuark "Economic Development Contrast Between South and North Korea" in Joseph Chung, ed., Patterns of Economic Development: Korea, (Michigan: The Korea Research and Publication, Inc., 1970).

Turkey 1950-1961. From Dosluoglu, Zeki, "Characteristics of Turkish Income Tax," in Central Treaty Organization (CENTO), Symposium on Tax Administration, Held in Tehran, Iran March 6-12, 1965, p. 100.

#### 6. Total Exports

Exports of goods and non-factor services cover all transactions of merchandise, freight, insurance on international shipments, transportation of goods and personal travel, and is obtained, with a few exceptions, from the World Bank, Socio-Economic Data Bank revised 10/13/1975. We utilized the additional collection of Raja Chelliah et. al. and Arthur House et. al. to fill some missing points. Remaining points were estimated by the same procedure described for Agricultural Production. For a few nations data was not available and we supplemented the collection as follows:

China, People's Republic 1950-1959. From Senator Proxmire's Office, U.S. Senate, "Notes on Statistics Provided for China, North Korea, and North Vietnam," 1975.

Korea, North 1950-1974. From Senator Proxmire's Office, U.S. Senate, "Notes on Statistics Provided for China, North Korea and North Vietnam," 1975.

Vietnam, North 1957-1974. From Senator Proxmire's Office, U.S. Senate, "Notes on Statistics Provided for China, North Korea and North Vietnam." 1975.

#### 7. Foreign Aid

Donors The final aid datum for a recipient country is the sum of all economic, military, and international aid received by that country in a year. Aid from international organizations includes only economic institutions. Major international donors are: The United States, the Soviet Union, the Soviet bloc, the People's Republic of China, and international organizations. Data on the U.S. and international organizations' aid were obtained from the Agency for International Development, Office of Statistics and Reports U.S. Foreign Assistance Annual, 1960-1973.

The aid figures taken from U.S. Foreign Assistance are the cumulative total of the following components:

I. ECONOMIC ASSISTANCE

- a. Loans and grants from A.I.D. and predecessor agencies
- b. Food for peace, emergency relief, economic development, and world food.
- c. Peace Corps and other; (other unspecified).

II. MILITARY ASSISTANCE

- a. Grants under Military Assistance Program (MAP)
- b. Credit sales under Foreign Military Sales (FMS)
- c. Grants under Military Assistance Service-Funded (MASF)
- d. Transfers from excess stocks
- e. Other grants (unspecified)

III. OTHER U.S. GOVERNMENT LOANS AND GRANTS

- a. Export - import Bank loans
- b. All other (unspecified)

IV. ASSISTANCE FROM INTERNATIONAL ORGANIZATIONS

- a. IBRD (International Bank for Reconstruction and Development)
- b. IFC (International Finance Corporation)
- c. IDA (International Development Association)
- d. IDB (Inter-American Development Bank)
- e. ADB (Asian Development Bank)
- f. AFDB (African Development Bank)
- g. UNDP (UN Development Program)
- h. EEC (European Economic Community)
- i. Other UN (UN Children's Fund and Regular Program of Technical Assistance and Specialized Agencies)

\*For our sample of countries the following programs are applicable:

Egypt	IBRD, IDA, UNDP, other UN
Syria	IDA, UNDP, other UN
Jordan	IDA, UNDP, other UN
Israel	IBRD, UNDP, other UN
India	IBRD, IFC, UNDP, other UN, EEC
South Korea	IBRD, IFC, IDA, ADB, UNDP, other UN
South Vietnam	ADB, UNDP, other UN

Aid to Communist countries were derived from Bureau of Intelligence and Research, U.S. Department of State, Research Study, (annual) mimeo.

Data for other countries were obtained as follows:

Korea, North, estimates of China's economic aid to North Korea

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were derived from Robert F. Dernberger, The Foreign Trade and Capital Movements of Communist China, 1949-1962, unpublished Ph.D. thesis (Harvard, 1965). The military component of the aid to North Korea was estimated in the following way:

First, we estimated the number of Chinese soldiers committed to the Korean war;

Second, we found the average size of the Chinese armed forces for the period 1950-1952;

Third, we estimated China's defense expenditures for the Korean war period.

We then assumed that China's fraction of military expenditures to total defense budget committed to the Korean conflict is proportional to the number of Chinese soldiers committed to the war as a fraction of the size of the Chinese armed forces. Furthermore, the cost of maintaining an army abroad is estimated to be twice as much as the maintenance cost at home. Also, by allowing in our calculations for the cost of Chinese military equipment used in combat or given to the North Koreans, we ended up with a cost multiplier of three instead of two. We believe this is a reasonable, if not conservative, estimate.

North and South Vietnam aid figures were taken from the M.T. Haggard, U.S. Congressional Service, "United States Expenditures in China and Korea" (mimeo) Appendices 1 and 2, April 28, 1975. These figures include military and economic aid received by the two Vietnams from all donors.

South Korea's aid figures were also taken from M.T. Haggard, loc. cit. page 2.

#### FOOTNOTES

1. Some important empirical attempts in the study of national power are:

Ray Cline, World Power Assessment, Washington D.C., Center for Strategic and International Studies, 1975; Clifford German "A Tentative Evaluation of World Power." Journal of Conflict Resolution, 4, 1 (March, 1960), 138-144; Klaus Heiss, Klaus Knorr and Oskar Morgenstern, Long Term Projections of Political and Military Power, (Princeton: Mathematica Inc., 1973); Wilhelm Fucks, Formeln Zur Macht, (Statgart: Deutsche Varlags-Anstalt, 1965); Klaus Korr, Military Power and Potential, (Massachusetts: D.C. Heath and Co., 1970); Jacek Kugler, "The Consequences of War: Fluctuations in National Capabilities Following Major Wars, 1880-1970," unpublished Ph.D. Dissertation, University of Michigan 1973 pp. 47-63 and 216-292.

2. A.F.K. Organski, World Politics, Second Edition, (New York: Alfred A. Knopf, 1968).

3. A more adequate measure has been suggested, but cannot be easily applied over time. See A.F.K. Organski, Bueno de Mesquita, and Alan Lamborn, "The Effective Population in International Politics," in Nash, Keir (ed.), Governance and Population: The Governmental Implications of Population Change. Volume 4 of Commission on Population and Growth and the American Future, Research Reports, (Washington: U.S. Printing Office, 1972).

4. David J. Singer, Stuart Bremer, and John Stuckey, "Capability Distribution, Uncertainty and Major Power War, 1820-1965," in Bruce Russett (ed.), Peace, War and Numbers, (Beverly Hills: Sage Publications, 1972).

5. Samuel Huntington, "The Change to Change: Organization, Development and Politics," Comparative Politics 3,3 (April, 1971) pp. 283-322.

6. Karl Deutsch, "Social Mobilization and Political Development," in Jason Finkle and Richard Gable (ed.), Political Development and Social Change, (New York: Wiley and Sons, 1966); Ted R. Gurr, "Persistence and Change in Political Systems, 1800-1971," APSR (December, 1974); Phillips Cutright, "Political Structure, Economic Development, and National Social Security Programs," in Macro-Quantitative Analysis: Conflict, Development, Democratization (ed.) by J.V. Gillespie and B.A. Mesvold, Vol. 1. (Beverly Hills, California, Sage Publications, 1971); Stein Rokkan and S.N. Eisenstadt (ed.), Building States and Nations (Beverly Hills, California, Sage Publications, 1973).

7. United Nations Research Institute for Social Development (UNRISD)

8. A.F.K. Organski, The Stages of Political Development, (New York: Alfred A. Knopf, 1965).
9. Samuel Huntington, op. cit., pp. 290-310; Lucian Pye, "The Concept of Political Development," The Annals of the American Academy of Political and Social Science, p. 358, (March, 1965), 2-13
10. Gabriel Ardant, "Financial Policy and Economic Infrastructure of Modern States and Nations," in The Formation of National States in Western Europe (ed.) by Charles Tilly (Princeton, New Jersey, Princeton University Press) p. 220.
11. The basis research in this area was carried on by economists of the International Monetary Fund. Most relevant publications in this area are:  
  
Jorgen Lotz and Elliott Morss, "Measuring 'Tax Effort' in Developing Countries," International Monetary Fund Staff Papers, 16 (1967), pp. 478-499; Raja Chelliah, "Trends in Taxation in Developing Countries," International Monetary Fund Staff Papers, July 1, 1971, pp. 254-331; Roy Bahl, "A Regression Approach to Tax Effort and Tax Ratio Analysis," IMF Staff Papers, (November 1971), pp. 570-610; and Raja Chelliah, Hassel Baas, and Margaret Kelly, "Tax Ratios and Tax Effort in Developing Countries, 1969-1971, International Monetary Fund, DM/74/47, (May 2, 1974).
12. Raja Chelliah, op. cit., pp. 295 and Roy Bahl op. cit., p. 590.
13. Roy Bahl, op. cit., pp. 582-583.
14. As Klaus Knorr pointed out, levels of military preparedness in peacetime are not a good indicator of the military strength of a nation in times of war. A direct measure of political development reduces the problem of estimating the strength of a nation over time, because the capacity of the political system in peacetime indicates the level of mobilization likely to be reached in times of military conflict.

Klaus Knorr, The War Potential of Nations, (Princeton: Princeton University Press, 1956).

15. The number of Chinese soldiers committed to the Korean war was estimated to be about 1,300,000. The United Nations forces numbered about 365,000 men. These figures were reported by Vincent J. Espesito, Head of the Department of Military Art and Engineering, United States Military Academy, in Encyclopedia Americana, V. 16 (1965) pp. 527-528k.

The estimated aid to North Korea over the war period (1950-53) is \$14,815 billions. See Appendix II, pp. 66-67.

The Korean War costs to the U.S. were estimated to be about \$49 billion (M.T. Haggard, "United States Expenditures in Indochina and in Korea," Congressional Research Record, Library of Congress (April 28, 1975).

16. Raja Chelliah, "Trends in Taxation in Developing Countries," International Monetary Fund Staff Papers, July 1, 1971, pp. 254-331; Roy Bahl, "A Regression Approach to Tax Effort and Tax Ratio Analysis," IMF Staff Papers, (November 1971), pp. 570-610.
17. Raja Chelliah, op. cit.,
18. See Pietro Balestra and Marc Nerlove, "Pooling Cross Section and Time Series Data in the Estimation of a Dynamic Model: The Demand for Natural Gas," Econometrica, Vol. 34, no. 3 (July, 1966).